National Defence
Défense nationale

B-GA-441-001/FP-001

TACTICAL LEVEL AVIATION DOCTRINE

WARNING

Although not classified, this publication, or any part of it, may be exempt from disclosure to the public under the Access to Information Act. All elements of information contained herein must be closely scrutinized to ascertain whether or not the publication or any part of it may be released.

Issued on Authority of the Commander 1 CAD **2000-12-01**

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Issued on Authority of the Commander 1 CAD

OPI: 1 Wing A7 Doctrine **2000-12-01**

Canada

FOREWORD

AUTHORITY

1. This publication, *Tactical Level Aviation Doctrine*, is issued on the authority of the Commander 1 CAD. It is effective upon receipt.

2. Suggestions for amendment should be forwarded to Headquarters 1 Wing, Attention: A7 Doctrine.

AIM

3. The aim of this publication is to detail tactical level aviation doctrine.

SCOPE

4. Canadian tactical aviation resources encompass those helicopters whose primary mission is to support the land forces. However, tactical aviation units and their resources are part of the air force. When these units and/or resources are not placed under OPCON of the land forces, tactical aviation conducts air operations for the air force. This publication focuses primarily on all the doctrinal tactical aviation roles, tasks and missions that support the land forces throughout the spectrum of conflict.

5. The keystone tactical aviation doctrine publication for "*Tactical Helicopter Operations*" is the B-GA-440-000/AF-000. This publication, the B-GA-441-001/FP-001, further details these tactical aviation tasks and missions at the tactical level.

6. The Canadian Forces operates only one helicopter fleet to support the land forces, the CH 146 Griffon. Despite this limitation, the CF must still be familiar with and cognizant of all doctrinal tactical aviation roles, missions and capabilities. This is because the CF, through its military alliances and during coalition operations, can request the aviation support of numerous types of helicopters. Therefore, this publication addresses not only utility helicopter doctrine, but also the doctrinal use of other helicopter types such as reconnaissance, transport and attack helicopters. This doctrine is based mainly on Land Forces Doctrine, NATO STANAGs, and US Army Aviation doctrine.

TERMS AND DEFINITIONS

7. Attention is drawn to the terms and definitions contained in the Glossary. These include terms and definitions from the NATO Glossary (AAP-6) and others specific to this publication. Abbreviations and a Glossary can be found at the end of this publication.

REFERENCES

8. The primary references for the preparation of this publication were:

a.	A-AD-121-F01/JX-000	*CF Manual of Abbreviations*;
b.	AAP-6 (U)	*NATO Glossary of Terms and Definitions*;
c.	ATP-40 (A)	*Doctrine and Procedures for Airspace Control in the Combat Zone*;
d.	ATP-41 (A)	*Airmobile Operations*;
e.	ATP-49 (C)	*Use of Helicopters in Land Operations*;
f.	B-GA-440-000/AF-000	*Tactical Helicopter Operations*;
g.	B-GA-442-001/FP-001	*Tactical Aviation Tactics, Techniques and Procedures*;
h.	B-GA-443-001/FP-001	*1 Wing WUSOPs*;
i.	B-GL-300-001/FP-000	*Conduct of Land Forces Operations* - Operational Level Doctrine for the Canadian Army;
j.	B-GL-300-002/FP-000	*Land Force Tactical Doctrine*;
k.	CFACM 40-46	*CH146 Standard Manoeuvre Manual*;
l.	CFACM 60-2605	*Airlift Operations - Search and Rescue*;
m.	R-GL-F01-101 (FM 1-101)	*Aviation Battlefield Survivability*;
n.	FM 34-130	*Intelligence Preparation of the Battlefield*;
o.	FM 1-115	*Attack Helicopter Operations*; and
p.	B-GG-005-004/AF-011	*CF Operations - NBC Defence*.

9. Related reference publications include the following:

a.	B-GL-331-003/FP-001	*Military Symbols for Land Operations*;
b.	C-05-010-022/TP-001	*General Procedures for Chemical Decontamination of Aircraft*;
c.	AP 3000	*British Air Power Doctrine*; and
d.	FM 90-4	*Air Assault Operations*.

10. **Family Of Tactical Aviation Publications**. The tactical aviation doctrine, tactics and procedures family of publications are as follows:

- a. B-GA-440-000/AF-000. ***Tactical Helicopter Operations***;
- b. B-GA-441-001/FP-001. ***Tactical Level Aviation Doctrine***;
- c. B-GA-442-001/FP-001. ***Tactical Aviation Tactics, Techniques and Procedures***;
- d. B-GA-443-001/FP-001. ***1 Wing Unit Standing Operating Procedures (WUSOPs)***;
- e. B-GA-444-001/FP-001. ***1 Wing Tactical Aide Memoire (TAM)***; and
- f. B-GA-445-001/FP-001. ***1 Wing CH 146 In-Flight Systems and Procedures Handbook***.

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CHAPTER 1

INTRODUCTION

ROLE

1. The role of tactical aviation is to support land force operations through the provision of **aerial firepower**, **reconnaissance**, and **mobility**.

INTEGRATION

2. Tactical aviation (tac avn) supports all combat functions of the land forces. Tactical aviation forms part of the combined arms team and must be fully integrated into land force operations to achieve its full combat potential.

3. **Air Manoeuvre**. Manoeuvre is defined as the employment of forces through movement in combination with speed, firepower or fire potential, to attain a position of advantage in respect to the enemy. Tactical aviation, through its inherent air mobility and firepower, is an air manoeuvre element. Operations within the land forces concept of ops, must take advantage of the vertical dimension of the battlespace, primarily by integrating the mobility and firepower of tactical aviation.

MISSIONS

4. **The Land Force Mission**. The mission of the Land Force is to generate and maintain combat capable, multi-purpose land forces to meet Canada's defence policy objectives.

5. **Mission Objectives**. This broad mission is broken down into a number of mission objectives. They include:

   a. **Defence of Canada**. This objective calls for deterring threats to and defending Canadian territory, the maintenance of Canadian sovereignty, and provision of military support to civil authorities;

   b. **Defence of North America**. This objective calls for defence of the North American continent in cooperation with the military forces of the United States in accordance with standing continental defence arrangements; and

   c. **Contributing to International Security**. This objective calls for participation in multilateral land or joint operations anywhere in the world under the auspices of the UN or NATO, or as part of a coalition. It may also involve humanitarian aid and relief efforts, restoration of stability, or participation in arms control and other confidence building measures.

6. **Tactical Aviation Doctrinal Missions**. Tac avn conducts combat, combat support, and combat service support missions and tasks by day and night throughout the battlespace during both war and operations other than war (OOTW). The land force commander determines how to best employ tac avn with the advice of the tac hel unit CO, who is also the land force commander's aviation and air advisor. The doctrinal missions that can be accomplished by tactical aviation include:

a. command and liaison (C&L);

b. reconnaissance;

c. tactical security;

d. direction and control of fire;

e. provision of helicopter fire support (anti-armour and attack helicopter operations);

f. combat airlift;

g. airmobile operations;

h. logistic airlift;

i. counter-mobility operations;

j. aeromedical support (CASEVAC and MEDEVAC);

k. communications assistance;

l. special operations (CSAR); and

m. operations other than war (OOTW, PSO, and Domestic Operations).

DEFINITIONS

7. These operations and missions are defined as follows:

a. **Command and Liaison** (C&L). The rapid transport of commanders, staff, and liaison officers to save time in battle procedure and to provide commanders with an aerial perspective of their area of operations (AO);

b. **Reconnaissance**. A mission to obtain information by surveillance or other detection methods, about the activities and resources of an enemy;

c. **Tactical Security**. The measures necessary to deny information to the enemy and to ensure that a force retains its freedom of action and is warned or protected against an unexpected encounter with the enemy or an attack;

d. **Direction and Control of Fire**. The airborne adjustment of both indirect and direct fire. This includes field artillery, mortars, naval guns, close air support, and armed or attack helicopters;

e. **Provision of Fire Support**. The provision of fire from a helicopter to attack and destroy (primarily armour) enemy targets;

f. **Combat Airlift**. The air movement of combat personnel, supplies and/or cargo over short or medium distances, normally in the brigade area of operations (AO);

g. **Airmobile Operation**. An operation in which combat forces and their equipment move about the battlespace in aircraft, normally helicopters, under the control of a ground force commander, to engage in ground combat. (ADTB). (Note. The US Army uses the term "Air Assault", instead of airmobile);

h. **Logistic Airlift**. The aerial transport of defensive stores, commodities and combat supplies either directly to the user or to delivery points where ground logistic units can store or deliver them;

i. **Counter-Mobility**. All actions taken to restrict the capacity of movement of the opponent;

j. **Casualty Evacuation** (CASEVAC). The movement of casualties to initial treatment facilities and/or to medical facilities in the combat zone;

k. **Aeromedical Evacuation** (MEDEVAC). The timely, efficient movement and enroute care by medical personnel of wounded and injured personnel from the battlefield and other locations to medical treatment facilities;

l. **Communications Assistance**. The assistance to communications provided by airborne radio rebroadcast (RRB), radio relay or service dispatch (the delivery of plans, messages and documents that cannot be delivered by other means). Communications assistance may include any activity, which may be executed by signals personnel operating from a helicopter platform;

m. **Special Operations**. Operations conducted outside of the normal combat and OOTW missions and tasks that are normally associated with tactical helicopter operations. They can include unconventional warfare, clandestine and covert activities, and Combat Search and Rescue (CSAR); and

n. **Operations Other Than War** (OOTW). Operations during peacetime and conflict that do not necessarily involve armed clashes between two organized forces.

CAPABILITIES AND LIMITATIONS

8. **Capabilities**. Tac avn significantly influences land force operations by:

a. conducting day, night, and limited visibility tactical helicopter missions and tasks throughout the entire AO;

b. providing flexible, fast response and lethal anti-armour firepower to attack armoured targets;

c. conducting operations against an enemy force from multiple directions;

d. providing near real time information throughout the area of operations;

e. increasing the tempo of friendly and enemy operations through speed, mobility, and firepower;

f. rapidly moving tactical units over long distances;

g. bypassing enemy positions, barriers, and obstacles to achieve surprise;

h. enhancing the command, control, and communications process;

i. moving supplies and equipment internally and/or externally to sustain operations;

j. transporting IOR repair parts;

k. conducting CASEVAC, MEDEVAC and personnel replacement operations;

l. conducting deep operations; and

m. providing CSAR coverage.

9. **Limitations**. Tactical helicopters are subject to operating limitations that the land force commander must consider when planning their employment. These limitations include:

a. extreme environmental effects that reduce the capabilities of helicopters to perform the full range of their missions;

b. limited capability to secure unit assembly areas;

c. the requirement for adequate planning and coordination time to fully capitalize on helicopter assets;

d. the vulnerability of helicopters to Anti-Aircraft Artillery (AAA), Surface to Air Missiles (SAMs) and small arms threats;

e. the requirement for helicopter-specific logistics support;

f. the availability of adequate Pick-up Zones (PZs) and Landing Zones (LZs) in the battle area;

g. the requirement for and the availability of large quantities of aviation fuel;

h. the limited number of helicopters to support a large combat force;

i. battlefield obscurants such as smoke and dust;

j. the requirement for second line maintenance to be conducted in a secure area;

k. the limited capability of tac hel units to rig loads for slinging. Supported units must arrange for rigging support, provide manpower to load/ unload internal loads; and

l. NBC contamination, which affects helicopter airframes and avionics moreso than ground vehicles. NBC decontamination is a more time consuming and labour intensive venture for helicopters.

ORGANIZATION

10. **Peacetime Organization**. Doctrinal wing/squadron organizations have rarely been fielded in Canada. From its beginnings, 10 TAG (Tactical Air Group) organized itself into non-doctrinal Tactical Helicopter Squadrons. These composite squadrons were structured to support the peacetime training requirements of the brigades, and did not represent a normal brigade level grouping. The largest constraint on forming doctrinal groupings, such as the Wing illustrated above, has been and continues to be the lack of numbers and types of helicopters. 1 Wing has the resources to field only the doctrinal Utility Squadron. Attack Helicopter and Armed Reconnaissance Helicopter units exist in coalition countries. During coalition operations, their use can be requested from the affiliated division, or in cases where a divisional structure does not exist, they may be grouped with the multi-national brigade as part of a special combat grouping.

11. **Doctrinal Organization**. Tactical doctrine encompasses the divisional level and below. At the divisional level, tactical aviation provides a Wing formation to support the division and its brigades. The doctrinal Wing organization is depicted at Figure 1-1. The Wing is composed of a Wing HQ, an Attack Squadron, a Reconnaissance Squadron, a Utility Squadron and an Aviation Maintenance Squadron.

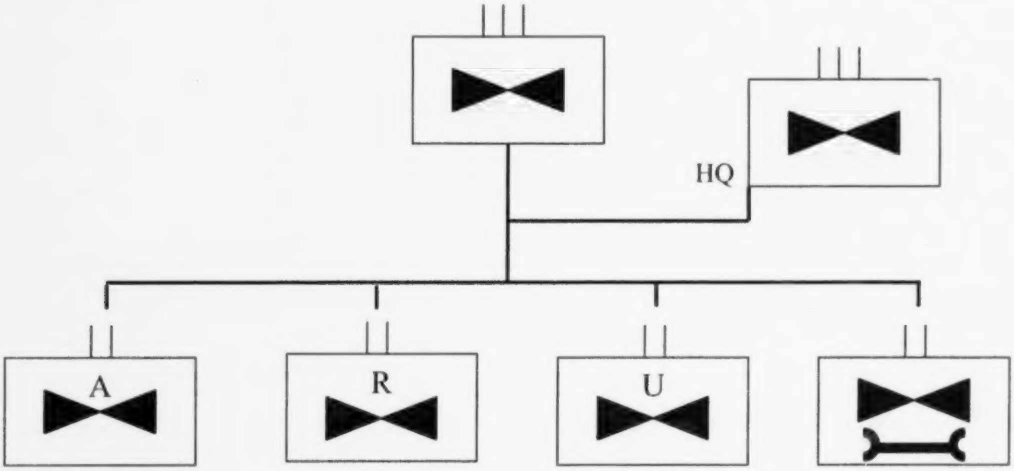

Figure 1-1. The Doctrinal Aviation Wing

CHAPTER 2

COMMAND AND LIAISON

GENERAL

1. Command and Liaison (C&L) is a mission, which has broadened over the years from its original intent. It was associated mostly with the CH 136 Kiowa as a Light Observation Helicopter (LOH) task, but any helicopter capable of carrying passengers can accomplish C&L.

MISSION

2. C&L is the rapid transport of commanders, staff, and liaison officers to save time in battle procedure and/or to provide commanders with an aerial perspective of their area of operations. This mission can be broken down into two basic tasks as follows:

   a. **Transporting Commander(s) and/or staff**. The intent of this mission can be twofold. The primary purpose is to speed up the mission planning process by transporting commanders and/or their staff to/from orders groups at the higher headquarters. In some circumstances, depending on time and the threat, the flight may include an overflight of the commander's area of operations to obtain situational awareness of the terrain. The scope of this mission can be broadened in the "commander" sense of the definition from the higher levels of command, down to the company and platoon commander level, depending on the time, space, urgency and importance of the mission; and

   b. **Transporting Liaison Officers**. Liaison officers can provide plans and/or orders from higher headquarters to lower or flanking headquarters which may require speed, or hand to hand delivery, and/or face to face discussions or briefings for security reasons. Although secure means exist to distribute this information, some commanders will prefer the personal delivery by liaison officers of written orders, overlays and maps to subordinate commanders. Helicopters provide speed to lessen the enroute delivery time. During coalition operations, the role of the liaison officer in providing the timely passage of information and orders could be vital to the success of the overall mission planning process.

CHAPTER 3

RECONNAISSANCE AND TACTICAL SECURITY

GENERAL

1. To operate effectively, land force commanders require timely and accurate information about the enemy and the environment. Reconnaissance (recce) is the primary means of providing this critical information. Recce allows follow-on forces to manoeuvre more freely and rapidly to the objective. Recce also allows the higher commander to keep other forces free from contact as long as possible and concentrated for the decisive engagement. Tactical Security missions involve both information gathering and protection of the main body. In order to enhance recce, tactical security and surveillance capabilities, electro-optical, FLIR mission kits, such as ERSTA, can be added to a helicopter.

ERSTA

2. **General**. The Electro-Optical Reconnaissance Target and Acquisition (ERSTA) mission kit gives trained helicopter crews a greatly enhanced capability to conduct reconnaissance, fire support and target acquisition tasks in support of land force operations and combat functions across the spectrum of conflict. The ERSTA mission kit is capable of functioning under day and night conditions. During joint operations, the ERSTA mission kit will be interoperable with the CF Information Architecture and compatible with other CF reconnaissance and surveillance systems (see Figure 3-1).

3. The ERSTA mission kit consists of three primary components:

   a. the Sensor Package (SP) which includes a passive multi-spectral sensor and an active laser range finder and designator mounted in a single housing on the exterior of the airframe;

   b. the Airborne Control Station (ACS) mounted in the cabin area of the helicopter, which includes the sensor controls, image and data displays, data link, recording equipment, computer and console; and

   c. the Ground Station (GS) consisting of sub-components similar to the ACS mounted on a console, in a vehicle or command post. Note that tac avn ground stations are assigned to and are operated by aviation units, but these are identical to the army units' ground stations. Aviation and ground units are able to transmit information through either ground station.

4. The ERSTA SP provides high-resolution imagery for detecting, recognizing and identifying targets and is capable of ranging and designating targets. The ERSTA SP functions are controlled from the ACS console. The ACS is capable of real and near-real time transmission of SP imagery, data and message text through a data link to the GS or other platforms supporting Tactical Common Data Link (TCDL) protocol. The GS is capable of receiving, recording and storing the imagery, data and reports transmitted by the ACS. The products of the ERSTA mission kit are mission dependant. Trained crews

will conduct reconnaissance, tactical security, or fire support tasks (through the use of target acquisition (TA) to direct either artillery, armed helicopters or AHs onto the identified and designated target). Exploitation of the ERSTA mission kit products and the conversion of those products from data to information to knowledge are the responsibility of the supported unit or ISTAR system.

5. The positioning of the GS and the transmission of imagery and data from the SP will be dependent on a number of factors. These factors include the tactical situation, the disposition of forces, the threat, the terrain and the mission, as well as the interoperability of the ERSTA mission kit with the information architecture, or the availability of interoperable ground based assets. For autonomous operations, the GS will be positioned as required to receive the data link from the ACS and disseminate the information to the supported commander, unit or agency. For joint operations, the GS will be positioned as required to function within the available information architecture.

6. In the absence of a weapons system with the ability to engage and destroy a threat, an ERSTA equipped helicopter is restricted to defensive manoeuvring in executing reconnaissance, tactical security, and fire support tasks. The primary tactics for performing reconnaissance and fire support missions are based on the use of covert flight profiles both behind and forward of the FEBA, maximizing the exploitation of the SP performance capabilities for operating at safe standoff distances. These tactics include the ability to complete the mission using masking techniques and tactics to avoid detection, and operating outside the effective engagement envelope of threat weapon(s) system(s) whenever terrain and the tactical scenario permit.

7. For operations in a threat environment, helicopters employed on reconnaissance, tactical security or fire support missions will normally be fitted with a defensive electronic warfare systems (DEWS), infra-red suppression systems (IRSS), armoured protection and door guns. Depending on the level of the threat and the availability of equipment, the array of DEWS equipment will normally include a missile approach and warning system (MAWS), a radar laser warning receiver (RLWR), and a chaff and flare dispenser.

8. Reconnaissance, tactical security or fire support missions undertaken in a threat environment will normally be conducted by a section of two ERSTA equipped helicopters. This tactic is based on the concept of mutual support. The second helicopter's primary task will be the protection of the other one conducting the mission.

9. The operational missions and tasks which may be undertaken by helicopters equipped with the ERSTA mission kit are defined under the following combat functions:

- a. Information Operations:
  - (1) reconnaissance, and
  - (2) tactical security;
- b. Firepower:
  - (1) target acquisition and designation, and

   - (2) direction and control of fire (AOP and FAC);

- c. Protection:
   - (1) tactical security (screen, guard, flank and rear area security),
   - (2) support of combat search and rescue (CSAR), and
   - (3) road move security; and
- d. Manoeuvre:
   - (1) tasks in support of airmobile operations, and
   - (2) tasks in support of insertion and extraction operations.

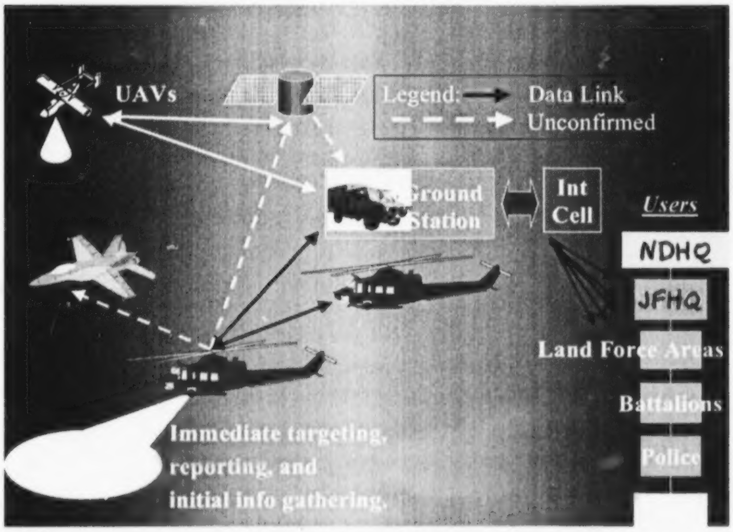
UAVs
Legend: → Data Link
- - - → Unconfirmed
Ground Station
Int Cell
Users
NDHQ
JFHQ
Land Force Areas
Battalions
Police
Immediate targeting,
reporting, and
initial info gathering.

Figure 3-1. ERSTA Concept of Operations – Information Flow

RECONNAISSANCE

10. Reconnaissance is a mission undertaken to obtain information by observation or other detection methods, about the activities and resources of an enemy. Information is a by-product of all operations, acquired as they are in progress. Recce, however, is a focused information collection effort. It is performed before and during other combat operations to provide information used by the land force commander to confirm or modify the concept of ops. Normally, a small, dedicated force is specifically assigned to conduct the tactical recce mission for a larger formation. This dedicated force is normally a combination of a ground force, specially trained to accomplish the three types of reconnaissance: route, zone and area. With the unique characteristics of terrain independence, speed, and long range electro-optical and FLIR systems, helicopters are ideally suited to perform recce missions. Ground reconnaissance forces provide detailed investigation and sustained presence. Ideally, the goal should be to combine and exploit the strengths of each of these forces.

(2) direction and control of fire (AOP and FAC);

c. Protection:

(1) tactical security (screen, guard, flank and rear area security),

(2) support of combat search and rescue (CSAR), and

(3) road move security; and

d. Manoeuvre:

(1) tasks in support of airmobile operations, and

(2) tasks in support of insertion and extraction operations.

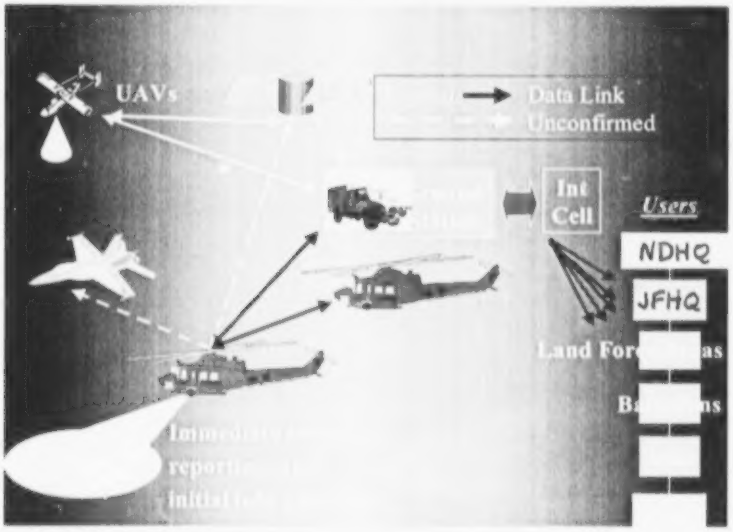

Figure 3-1. ERSTA Concept of Operations – Information Flow

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Figure 3-2. OH 58D Recce Section

RECCE PRINCIPLES

11. The detailed procedures for employing and controlling a combined helicopter and ground force recce operation is the responsibility of the designated land unit or sub unit commander. The land force recce commander must consider the complexity of combined recce operations and provide effective C2 and co-ordination for all forces directly involved, including indirect fire support. The fundamental principles of recce are well established and apply to both helicopter and land recce forces. These fundamental principles are:

a. rapidly provide the commander with fresh, timely, and accurate information on the enemy and the designated terrain;

b. use the required number of available reconnaissance forces required to accomplish the mission;

c. focus on the recce objective;

d. gain and maintain contact with enemy forces;

e. develop the situation so the maximum information is obtained; and

f. avoid becoming decisively engaged with the enemy.

RECCE METHODS

12. The three methods of conducting reconnaissance are by stealth, in force, and dismounted. Each method has unique advantages and disadvantages. The recce methods are detailed as follows:

a. **Reconnaissance by Stealth**. As the name describes, reconnaissance by stealth strives to acquire information without exposing the recce force to non-friendly forces. Surveillance is the primary task performed. Not only does the stealth reconnaissance element avoid physical contact with the opposing force, but it also avoids being detected. Helicopters gather information through quiet and deliberate stand off techniques. This denies the opposing force the opportunity of obtaining information on the recce force;

b. **Reconnaissance in Force**. The purpose of reconnaissance in force is to compel the enemy to disclose the location, size, strength, disposition or intention of the force by making the enemy respond to offensive action. Armed/Attack helicopters, with their standoff target detection and engagement ability, speed and lethal firepower, can employ this method very effectively. This method can also determine the opponent's willingness to fight; and

c. **Dismounted Reconnaissance**. Aircrew may be required to dismount from the helicopter, in extreme circumstances, when information is required on a specific reconnaissance objective. This technique is time intensive, can place the helicopter in a vulnerable position, and does not make the best use of a helicopter resource.

RECCE TYPES

13. Recce is divided into three types of missions: Route, Zone, and Area. (Note that Area Recce includes what some nations call a "Point Recce", i.e. a bridge, where the bridge is a very small, defined area). Helicopters conducting any of these recce missions can employ anyone of these three recce methods. The three types of recce are detailed as follows:

a. **Route Recce**.

(1) **General**. The objective of a route recce is to obtain detailed information on a specific route and all aspects that could affect the military use of that route. The assigned route may be a road or an axis of advance. In either case, it should be well defined and have a designated start and end point. Conducting a recce of a single route normally requires only one section of helicopters. However, there may be multiple route reconnaissances being conducted simultaneously, thereby requiring multiple sections of helicopters. The essential information required includes, but is not limited to:

(a) the enemy situation,

(b) the condition of the route,

(c) the load classification of roads and bridges,

(d) the dominating terrain,

(e) the location and state of urban areas, and

(f) the restrictions, limitations, lateral routes, obstacles and bypasses,

(2) **Helicopter Only**. In a no threat or a low threat situation, with the ability to conduct long range observation and to traverse the route rapidly, a helicopter section(s) can quickly complete a route recce. Even though helicopters do not drive or physically test the route, trained aircrew can acquire most of the essential information. When necessary, the crew or specific passengers can dismount and conduct detailed analysis inspections at critical points, and

(3) **Helicopter and Ground Operations**. When conducting a combined helicopter and land force recce, helicopters can rapidly scan the route for any obvious enemy and critical points of interest. They can also inspect any dominating terrain adjacent to the route while concurrently securing the flanks for the ground recce element. This permits the land force element to advance rapidly and to concentrate on the physical condition of the route and critical points. The land force should actually drive the route and conduct detailed inspections in those areas, such as forests and urban areas, where helicopters cannot observe;

b. **Zone Recce**.

(1) **General**. The zone recce is the most time consuming and comprehensive of the recce missions. Its objective is to provide the land force commander with detailed information regarding the zone before the next larger formation enters the zone. The level of detailed information achieved will depend on factors such as the commander's intent, and the time and recce troops available. Within the constraints of these factors, the following tasks should be inherent to zone recce:

(a) the detection of enemy activity,

(b) the inspection of all terrain within the zone to evaluate its military use and suitability for traffic,

(c) the inspection and classification of all bridges, fords, tunnels and other obstacle crossing sites,

(d) the load classification of all routes, including overpasses and underpasses,

(e) the location of all mines, obstacles, and barriers, and

(f) the location of bypasses for obstacles, barriers and urban areas,

(2) A zone recce is normally conducted in advance of a larger force's offensive manoeuvre. The recce force commander will have conducted a thorough appreciation prior to the start of the recce mission. The force conducting the recce needs to be agile and afforded a great degree of freedom of how to accomplish its mission. This facilitates the discovery of a path of least resistance and opportunities may be exploited as they occur. Essentially, the recce force preserves its parent formation's combat power by "pulling" it through the zone. A single unit or a series of adjacent units may conduct the zone recce. The dimensions of these zones are not standard, but will be based on the type of terrain, the capabilities of the recce force, and the time available to complete the mission. Within the boundaries of the zone, phase lines will be designated which are generally perpendicular to the axis of advance to control and coordinate the advance. Additional control measures, such as contact points, coordination points, or internally generated boundaries/phase lines, may be used,

(3) **Helicopters Only**. In a no threat or a low threat situation, the use of a helicopter section(s) can significantly increase the speed and agility of the recce, thereby reducing the time required. However, certain features will require the helicopter crews to dismount in order to conduct detailed inspections, e.g. forest and tunnels. If a zone contains numerous such features, their advantage of speed will be diminished,

(4) **Helicopter and Ground Operations**. Ideally, helicopter and land forces should be combined to conduct the zone recce mission. By using advanced optics to observe and manoeuvrability to reposition to successive vantage points, helicopters can easily cover large open areas relatively quickly and detect any significant activity. This enables the land recce force to expedite movement to the critical points where a detailed reconnaissance is required. Specifically, land and helicopter forces can compliment each other by:

(a) helicopters reconnoitring terrain not easily accessible to ground vehicles, such as steep terrain or marshes. Likewise, land forces cover forests, urban areas, and other areas not easily accessible to helicopters,

(b) helicopters rapidly scanning the zone to locate large moving enemy formations and checking specific key points. The land force elements can then conduct a detailed examination of critical points, while the helicopters secure the flanks, and

(c) helicopters securing the far side of obstacles and locating potential bypasses while land elements conduct detailed inspections of these areas; and

c. **Area Recce**.

(1) **General**. The objective of an area recce is to obtain detailed information on a specific feature such as a town, forest, valley or other identifiable feature (i.e., a bridge). The entire focus of the recce force will be the designated feature. The recce activity is similar to that of a zone recce. Within the assigned area, the recce force is required to perform the same tasks as the zone recce,

(2) Despite the similarities, the two main differences between the zone and area recce are:

(a) **the geometry of the boundaries**. With a zone recce, the boundaries are distinctly linear and box-shaped. The base of the box is normally on the FLOT and designated the line of departure (LD). The mission and forward movement begins at the LD with the zone frequently covering the recce elements higher formation's entire front. An area recce is normally defined by circular or irregular, but enclosed boundaries, and is a comparatively smaller area than the zone recce, and

(b) **the relative location of the recce area to friendly forces**. For the zone recce, normally, the recce force begins from friendly territory at the LD and moves into terrain not controlled by friendly forces. Frequently, friendly forces follow the recce force through the zone. In contrast for an area recce, the recce force must usually travel to the area, which may or may not be in friendly controlled territory. This travel may be accomplished by a tactical or administrative road move to their assigned area. Enemy contact is avoided en route to their area. Usually, friendly forces do not immediately follow the force conducting an area recce, and

(3) the decision to conduct a combined, ground and helicopter area recce is the land force commander's, on advice from the aviation unit CO.

SURVEILLANCE

14. Surveillance is defined as the systematic observation of the battle area by visual, aural, electronic, photographic or other means to detect, track and report enemy movement, strength and avenues of approach for combat intelligence purposes.

15. Surveillance may include the observation of bridges, crossroads, built up areas, points of tactical interest and avenues of approach. Surveillance is normally required as a means of conducting reconnaissance, screens, guards, and rear area and flank security missions.

TACTICAL SECURITY

16. **General**. Tactical security missions are conducted to gather information about the enemy, and to provide early warning, reaction time, manoeuvre space and protection for the main body. The main difference between tactical security and reconnaissance is the protection of the main body. Protection can be achieved by directing field artillery through AOP (Chapter 4), from controlling Close Air Support through FAC (Chapter 4), and by fire support from AHs (Chapter 5). Tactical security missions are characterized by reconnaissance to reduce terrain and enemy unknowns, gaining and maintaining contact with the enemy to ensure continuous information flow, and providing early and accurate reporting of information to the protected force. Tactical security missions are defined by both the degree of protection offered to the main body and the physical characteristics of the operation. Tactical security missions include screen, guard, covering force, and area security missions.

17. **Screen**. The primary purpose of a screen is to provide early warning to the main body. Based on the higher commander's intent and the screen's capabilities, it may also be required to destroy enemy reconnaissance and impede and harass the enemy main body with indirect and/or direct fires. Screen missions are defensive in nature and are largely accomplished by establishing a series of OPs, AOPs and conducting patrols to ensure adequate surveillance of the assigned sector. The screen provides the protected force with the least protection of any tactical security mission. The critical tasks of a screen mission are as follows:

a. provide early warning of enemy approach;

b. maintain continuous surveillance of all battalion-size avenues of approach into the sector; and

c. gain and maintain enemy contact and report enemy activity.

18. **Guard**. A guard force accomplishes all the tasks of a screening force. Additionally, a guard force prevents enemy ground observation of, and direct fire against the main body. A guard force reconnoiters, attacks, defends, and delays as necessary to accomplish its mission. A guard force normally operates within the range of the main body's indirect fire weapons. The main body force commander will assign a guard mission when contact is expected or when there is an exposed flank.

19. **Covering Force**. A covering force accomplishes all the tasks of screening and guard forces. Additionally, a covering force operates apart from the main body to develop the situation early, and to deceive, disorganize and destroy enemy forces. Unlike screening or guard forces, a covering force is tactically self-contained and capable of operating independently of the main body.

20. **Area Security**. Area security is a form of security that includes reconnaissance and tactical security of designated personnel, airfields, unit convoys, facilities, main supply routes, lines of communications, equipment, and critical points. An area security force neutralizes or defeats enemy operations in a specified area. It operates in an area delineated by the headquarters assigning the area security mission. It screens, reconnoiters, attacks, defends, and delays as necessary to accomplish its mission. Area security ops focus on the enemy, the force being protected, or a combination of the two.

21. **Road Move Security**. Road move security is a variation of route security that is performed when conducting tactical security for the entire route is not feasible. This may be because of the length of the route, the strength of the enemy forces, or the limitations of available tactical security assets. The integration of air and land forces during road move security operations works best. Aviation may conduct limited route reconnaissance in conjunction with a zone reconnaissance forward of the scout platoons that are better suited for the escort element. Aviation may additionally conduct a flank and a rear screen as the road move elements move along the route.

CHAPTER 4

DIRECTION AND CONTROL OF FIRE

GENERAL

1. Direction and control of fire has been an important mission of aviation since its inception. This is because of the ability of recce helicopters to locate and accurately identify enemy targets, for field artillery, close air support aircraft, and for armed and attack helicopters.

FIREPOWER AT THE TACTICAL LEVEL

2. At the tactical level of conflict, battles, engagements and other actions are planned and executed to accomplish military objectives established by the operational level commander. Tactical firepower consists of the coordinated and collective use of target acquisition data, direct and indirect fire weapons, armed aircraft and other means against enemy elements in contact or imminent contact. Tactical firepower includes direct fire weapons, field artillery, mortars, close air support, armed and attack helicopters, naval gunfire and offensive Info Ops. Manoeuvre commanders normally direct tactical firepower in support of manoeuvre operations. Firepower and manoeuvre forces are concentrated at decisive points to destroy enemy elements when the opportunity presents itself and when such a confrontation fits the larger purpose.

3. **Fire Support Coordination**. The integration and synchronization of fire support with the land force commander's battle plan is achieved through the process of fire support planning and coordination. Formal planning and coordination binds the fire support resources together in a common effort with the aim of attacking targets with the most effective and efficient attack resource(s) in accordance with the commander's intent. In coordinating fire support, cooperation among the various fire support agencies is necessary for the effective delivery of fire. This is accomplished through the Fire Support Coordination Centre (FSCC). The G3 Aviation is part of the FSCC.

4. **Control of Fire - AOP**. Helicopter aircrew can conduct Air Observation Post (AOP) missions to direct and adjust fire onto acquired and identified targets. AOPs can operate either as a direct resource of the FSCC or under the control of a Forward Observation Officer. Airborne adjustment of fire, whether these fires originate from field artillery, mortars, naval gunfire, armed helicopters, attack helicopters, or close air support (CAS), follows the same fundamentals as adjustment of fire from the ground. Airborne platforms provide increased mobility and a much improved field of view, both of which aid immensely in the conduct of direction and control of fire missions. The key to successfully bringing fire onto a target is to accurately identify the target's exact grid. This capability is greatly enhanced by the target acquisition function of ERSTA.

5. **Aviation Fire Support**. Tactical aviation, as a manoeuvre force, contributes to fire support by acquiring and identifying targets, designating targets by laser designation, adjusting indirect fires, and providing direct fire support with armed and attack helicopters (see Chapter 5). De-confliction of airspace and control of fire must be closely coordinated through the applicable FSCC and Army manoeuvre forces.

6. **SEAD**. Suppression of Enemy Air Defence (SEAD) is an essential part of operations employing air missions beyond the FEBA. It is the activity that neutralizes, destroys, or suppresses enemy AD systems in a specific area by physical attack and electronic warfare to enable CAS and helicopter operations to be successfully conducted. It increases the probability of success and reduces the loss of friendly air power. Before a CAS request is submitted, the benefits of the support are weighed against the SEAD effort required to accomplish the mission. In some cases, SEAD may take priority over other artillery missions. SEAD requires an integrated air and land force effort to locate and suppress enemy air defence systems.

7. **Planning**. Fire support is utilized to support aircraft flying past areas of known enemy positions. This fire support should be intense and of short duration because of aircraft speed past specific points. They are planned on areas and scheduled at times when flights are endangered. Fire plans may cover PZs, LZs, flight routes, and suspected enemy avenues of approach to LZs. Fire support plans include lethal and, non-lethal SEAD. Plans should ensure that friendly elements do not use ordnance, which obscures aircrew vision, especially during NVG missions. Whenever possible, operations should take advantage of the coordinated effects of all elements of the combined arms team. Coordinating and synchronizing actions with CAS aircraft provides enhanced effects and increased survivability.

8. **Field Artillery**. Field Artillery provides close support, SEAD, counter battery fire, interdiction, attrition, coordination, and target acquisition to manoeuvre forces, as required. Field Artillery units also have limited ability to destroy, neutralize, suppress, or harass enemy targets including mobile armour. SEAD fire is designed to facilitate the manoeuvre of air assets. SEAD delivery systems include guns, rockets, missiles, and potentially non-lethal systems. These delivery systems can provide fire support under all conditions of weather and in all types of terrain. They can shift and mass fire rapidly without having to move, and the extended ranges of rockets and missiles enable the commander to attack in-depth. A variety of gun munitions provide increased flexibility in attacking targets.

9. **Dedicated Fire Support**. Land Force firepower assets are rarely assigned a tactical task to provide dedicated fire support for SEAD. Rather, through the effective use of tactical tasks, prioritization of fires, and the commander's intent, specific fire support tasks can be managed more efficiently. Because the exact location of every enemy AD weapon cannot be known, some suppression assets should ideally be immediately available to pilots or observers. Before an operation begins, units to support the SEAD plan may be identified or may be planned for in the Attack Guidance Matrix for Land Forces or in the ATO for Air Forces. The priority of fire for these identified units shifts to providing fire support for SEAD when aircraft are used in the area via the

FSCC. Suppressive fires are routinely planned against known and suspected SA-6, SA-8, and SA-11 AD sites.

10. **Fire Support Requests**. Normal fire support request channels are used for the engagement of targets of opportunity. Because of the mobility and small size of most AD targets, aircrew use observed fire techniques and engage targets immediately upon detection. Fire is adjusted on these targets by forward ground observers or attack or recce helicopter pilots (AOP). Commanders may order the forward ground observer or AOP to locate and bring under attack enemy AD systems in the vicinity of the target just before the arrival of CAS aircraft.

11. **Fire Support Coordination Measures**. These measures are depicted on maps, charts, and overlays either to reduce requirements for coordination or to restrict firing into certain areas. Restrictive measures are those that restrict or prohibit firing into an area. Permissive measures are those that reduce requirements for coordination and thereby expedite the attack of targets. When a restrictive or permissive measure is used, the graphic display contains the title (abbreviation) of the measure, the establishing headquarters, and an effective date-time group.

RESTRICTIVE FIRE SUPPORT MEASURES

12. **Restrictive Fire Area**. An RFA is an area with specific restrictions and in which fire that exceeds those restrictions is not delivered without coordination with the establishing headquarters.

13. **No-Fire Area**. An NFA is an area into which no fire or effects are allowed. The two exceptions to the NFA are when the establishing headquarters allows fire on a mission by mission basis; or when a friendly force is engaged by an enemy located within the NFA, and the commander returns fire in defence.

14. **No-Fire Line**. The NFL is a line short of which artillery or ships do not fire except on request or approval of the supported commander, but beyond which they may fire at any time without danger to friendly troops. Within a NATO force this line may be referred to as the Fire Support Safety Line (FSSL).

15. **Restrictive Fire Line**. The RFL is a line between converging friendly forces that prohibits fire, or the effects of fire, across the line without coordination with the affected force.

16. **Airspace Coordination Area**. An informal ACA is normally used for immediate air strikes, and can be established at the battalion level or higher. An informal ACA can be established by using lateral, altitude, or timed separation. They are usually in effect for a very short period of time. A formal ACA is a three-dimensional block of airspace that provides lateral and altitude separation between aircraft and other fire support assets, and is established by a brigade or higher.

PERMISSIVE FIRE SUPPORT MEASURES

17. **Fire Support Coordination Line**. The FSCL is a line established and adjusted by the appropriate land commander (usually the corps commander) within their boundaries in consultation with superior, subordinate, supporting, and affected commanders. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide, both in the air and on the ground.

18. **Free Fire Area**. An FFA is a specific, designated area into which any weapon system may fire without additional coordination with the establishing headquarters.

AIRSPACE CONTROL MEASURES

19. **General**. New airspace control measures are being adopted by NATO and include the following:

a. **Special Corridor** (SC). An area established specifically to accommodate the special routing requirements of specific missions. (ATP - 40(B));

b. **Transit Corridor** (TC). A bi-directional corridor in the rear area, air traffic services not normally provided. (ATP - 40 (B));

c. **Transit Route** (TR). A temporary corridor of defined dimensions established in the forward area to minimize the risk to friendly aircraft from friendly Air Defence or surface forces. (ATP - 40 (B)); and

d. **Standard use Army Aircraft Flight Route** (SAAFR). A route established below the coordination altitude to facilitate movement of helicopters in the forward area in direct support of ground operations. (ATP - 40 (B)).

AIR DEFENCE WEAPONS CONTROL ORDERS

20. The definitions from A-AD-121-AAP/JX-001 for weapons control orders (WCOs) are as fols:

a. **Weapons Tight**. In air defence, a weapon control order imposing a status whereby weapons systems may be fired only at targets recognized as hostile;

b. **Weapons Hold**. In air defence, a weapon control order imposing a status whereby weapons systems may only be fired in self-defence or in response to a formal order; and

c. **Weapons Free**. In air defence, a weapon control order imposing a status whereby weapons systems may be fired at any target not positively recognized as friendly;

21. WCOs were created specifically for the use of ground-based air defence weapons systems, such as Javelin and ADATS. AD WCOs are AD control measures used to defend against air targets. That is why aircrew must know which WCO is in effect and when it is effective. AD WCOs are not intended for non-AD units or helicopters.

22. However, within the air defence paragraph of an Op O, there will be an "All-Arms Air Defence (AAAD) WCO" which will use the same definitions, but normally at a different Weapons Control Status (WCS). It is directed at all other land force weapons systems that could be used against air targets. Normally, the AAAD WCS will be "Weapons Hold". This is because the primary function of these other units is not air defence. However, this does give these ground units the right to fire in self-defence at any attacking aircraft. AD WCOs also have no effect on a ground unit's ability to engage ground targets. For instance, even though Weapons Tight or Weapons Hold may be in effect for AD units, this will not affect an infantry or a recce unit's ROEs for engaging enemy ground targets. Despite the fact that the low level airspace may seem to be a safe place to fly with restrictive AD WCOs in effect, there may be unlimited engagements going on between opposing ground forces.

23. ROEs will cover the firing of weapons from aircraft at ground targets, whether it be from a CAS aircraft or a helicopter. Even if Weapons Hold applied to aviation, it would give the crew the option of firing the door gun self-defence weapon in a self-defence situation, but only in an AD scenario (i.e. engaging an air target). AD WCOs have no affect on whether a helicopter door gun should engage enemy ground targets. See B-GA-442-001/FP-001, *Tactical Aviation TTPs*, Chapter 4, for details on door guns.

CLOSE AIR SUPPORT (CAS) AND FORWARD AIR CONTROLLING (FAC)

24. **General**. CAS is air action against targets that are in close proximity to friendly land forces and directly affects the course of the land battle. These missions require detailed integration with the fire and manoeuvre of supported forces to increase effectiveness and to avoid fratricide. The tactical air control system plans, directs, and controls CAS missions, which are executed, based on preplanned or immediate requests.

25. **Preplanned Requests**. Preplanned requests are those for which a requirement can be foreseen. They permit detailed planning, integration, and coordination with the ground tactical plan. Munitions can be tailored precisely to the target.

26. **Immediate Requests**. Immediate requests are those requests received from supported ground commanders to fulfill urgent, unforeseen requirements. Details of the mission are generally coordinated while aircraft are held on alert or are airborne. The brigade Tactical Air Control Party (TACP) transmits the request directly to the Air Support Operations Centre (ASOC) at the division or corps headquarters over the air request net. The TACP at each intermediate HQ level monitors the transmission. Each intermediate TACP coordinates the request with the G3 and the Fire Support Coordination Cell (FSCC) at their level to determine approval or disapproval of the request. Silence by an intermediate TACP indicates approval by the associated HQ unless a disapproval is transmitted within a specified time stated in the unit SOP. (Normally, the time is 10 minutes). If any higher headquarters above the initiating level

disapproves the request, the TACP at that headquarters notifies the ASOC and the initiating TACP, giving the reason for the disapproval. The ASOC passes a copy of the request to the Corps G3 Air, who is collocated in the TACAIR support element, for coordination with the FSCC. When the request is approved, the ASOC orders the mission flown. Response to immediate requests may involve launching general alert aircraft, using ground or air alert sorties, or diverting airborne aircraft from other missions.

27. **Use of CAS**. To be effective, CAS must be employed against targets that present the most immediate threat to the supported force, weighed against the aircraft's payload or available weapons. Almost any threat encountered inside the FSCL and near the FLOT may be suitable for CAS targeting, but the indiscriminate use of CAS may needlessly increase the attrition of attack aircraft and increase the chances of fratricide. No single category of target is most suitable for CAS application. Mobile massed armour formations, however, present a threat to friendly ground forces and thus are prime candidates for air attack.

28. **CAS Control**. A TACP advises the ground commander and his staff on the integration of CAS operations with ground operations. The TACP also coordinates and directs close air strikes in conjunction with a designated FAC and the applicable FSCC. The Brigade TACP can consist of an ALO, the G3 Air and the G3 Avn. A CAS strike is normally controlled by a ground or an airborne Forward Air Controller (FAC). When ordnance is a factor to the safety of friendly troops, the aircraft's axis of attack should be parallel to the friendly forces. The FAC identifies friendly positions in relation to the target, locates and describes the target, talks the fighter onto the target and clears the pilot to drop the requested ordnance. Helicopters have both VHF and UHF capabilities to talk to CAS aircraft. The FAC is controlled by the applicable FSCC.

JOINT AIR ATTACK TEAM (JAAT)

29. A JAAT operation is a coordinated attack involving a combination of aviation and CAS, normally supported by field artillery or naval gunfire and, where possible, by electronic warfare assets. JAATs normally operate in a coordinated effort with ground manoeuvre forces against enemy armoured formations, command vehicles and AD systems. The purpose of a JAAT is to create a joint team that can provide the land force commander with a flexible combination of firepower that can move quickly across the battlefield. G2, G3, artillery, aviation and air staffs will carry out the IPB, plan the operation and prepare the fire plan, the Airspace Control Order and the AD Weapon Control Order. A formation commander will usually delegate the planning and coordination of a JAAT mission to the artillery advisor, who will then prepare and issue the JAAT Mission Orders. Control of the JAAT is then delegated to an appropriate aviation commander, who will deploy to execute the operation using assigned airborne FACs, artillery observers, artillery, aviation and air forces. These attacks are usually planned and coordinated at formation level and controlled down to the brigade level.

CHAPTER 5

PROVISION OF HELICOPTER FIRE SUPPORT

GENERAL

1. Generating combat power on the battlefield requires combining the movement of combat forces with the employment of their direct fire resources. The more immediate the combat in time and space, the more intertwined are firepower and manoeuvre. Helicopters armed with offensive weapons systems provide the land force commander with a mobile and lethal manoeuvre element as part of a combined arms team. The technology required for target identification, target designation and the weapons systems themselves are very costly items, making these helicopters high value assets. In order to protect them during their missions, they must operate in mutual support of ground units during close operations, and be protected by SEAD (see Chapter 4) during deep and special operations.

2. Since these are such high value assets, their control is normally retained at a high level. In a war scenario, these are Corps and Divisional assets. They are used as a manoeuvre firepower force by the corps and div commander(s) against lucrative armour targets. The likelihood of brigades having attack helicopter support, in a corps or a division size operation, is not very high. This is not the case, however, in OOTW. An attack helicopter unit could be placed OPCON of a brigade group or a brigade, if that were the largest size formation in an area of operations (see para 39). In this case, attack helicopters could be used against a smaller number of targets.

3. In the 1980s, many CF army and tac hel personnel worked with US Army Cobra helicopter units during NATO operations. Some still use this Cobra experience as how attack helicopters operate. In those days, attack helicopter target identification and engagement distances were limited to a maximum of 4 kms. At these distances, the supported ground unit would easily be able to see the entire engagement from the attack helicopter's firing position to the target. Anti-armour missiles of this era were normally wire guided (TOW), requiring the helicopter crew to remain in the hover to guide the missile onto the target. Subsequently, the Hellfire missile was developed to hit targets by means of laser designation. Since then, improved technologies have permitted increased standoff and engagement distances to 8+ kms. The new Hellfire 2 missile on the AH 64D Apache Longbow is a fire and forget weapon. The RAH (Recce Attack Helicopter) 66 Comanche incorporates leading edge technology to further enhance aviation firepower capability.

4. **Definitions**. Helicopters capable of performing fire support tasks include those that possess effective "button-on" armament packages. Definitions relating to helicopters capable of providing fire support are as follows:

   a. **Armed Helicopter**. "A helicopter fitted with weapons or weapon systems". (AAP-6);

   b. **Anti-Armour Helicopter**. "A helicopter armed primarily for use in the destruction of armoured targets". (AAP-6);

c. **Attack Helicopter (AH)**. "A helicopter specifically designed to employ various weapons to attack and destroy enemy targets". (AAP-6); and

d. **Armed Recce Helicopter**. "A helicopter designed to enhance the lethality and tempo of land force manoeuvre through armed reconnaissance and the application of precision firepower". (AS Army).

5. Weapons systems are mounted on helicopters to give them the firepower required to support the land forces and/or to protect themselves. There are a variety of weapons systems that can be mounted from chin mounted gattling guns to fire and forget missiles, which affect the role of the helicopter to which it is mounted. Generally, these weapons fall into either a self-defence, a defensive or an offensive category. Most utility helicopters can be equipped with a Defensive Early Warning Suite (DEWS) and are capable of becoming armed helicopters with add on missile, rocket and/or cannon mission kits.

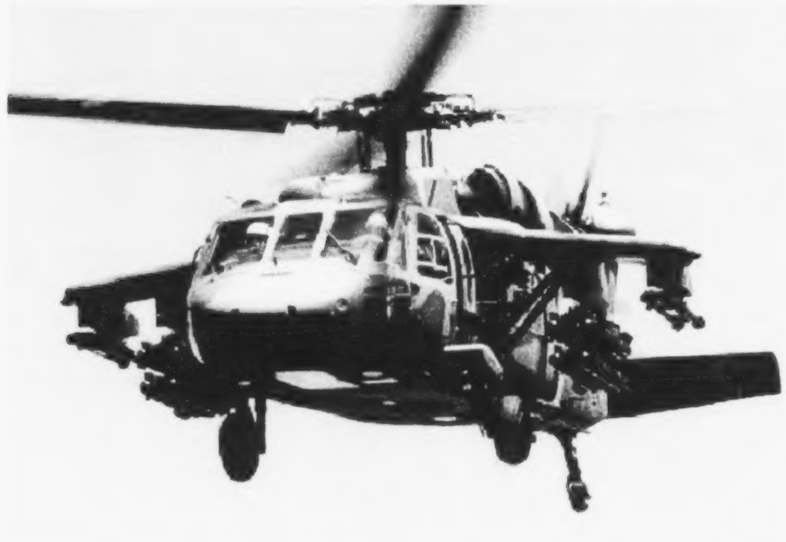

Figure 5-1. An Armed Utility (Blackhawk) Helicopter

DOOR GUNS

6. A door gun is an add on mission kit, mounted externally on either or both sides of a helicopter. A door gun gives a helicopter a limited capability of providing suppressive or defensive fire when engaged in airmobile operations and other operations, which require self-defence. Externally mounted door guns also provide a visual deterrent. There can be situations when unexpected opposition is encountered, particularly in a LZ during the landing or the deplaning phase of an

airmobile. In these cases, door guns can provide some suppressive fire capability for the limited period of time when the helicopter is in the LZ area and initiating alternate/evasive actions. For airmobile operations, ROEs, arcs of fire and areas of responsibility for each helicopter in the formation need to be assigned in order to provide the best area of protective coverage and to limit the possibility of fratricide. Operations that could utilize door guns are:

a. self-defence during reconnaissance or tactical security missions;

b. self-defence during special operations;

c. self-defence during operations other than war; and

d. self-defence during CASEVAC from hostile areas.

7. Door guns are purely defensive in nature. They do not and are not intended to provide the offensive fire support, which is provided by armed or attack helicopters. (For details on door gun ops, see the *Door Gunnery* chapter in *Tactical Aviation TT&Ps*).

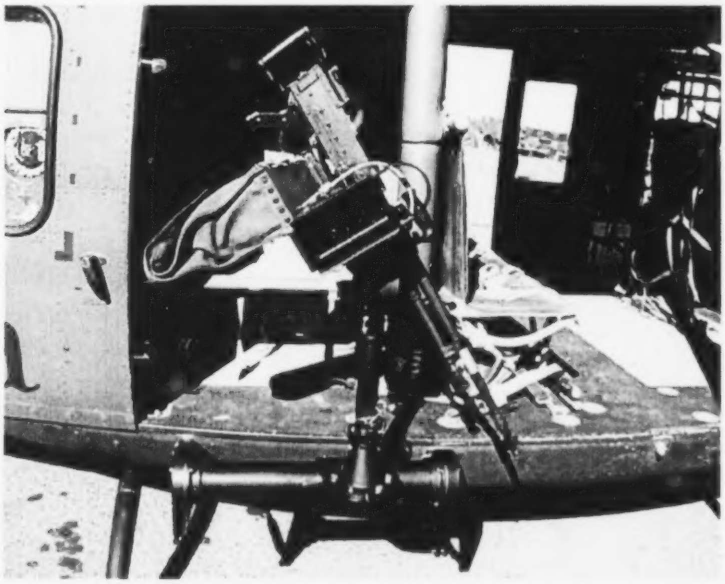

Figure 5-2. C6 Door Gun

ARMED HELICOPTERS

8. **General**. Many nations have armed helicopters, which were not initially designed for this role. These include the Lynx utility helicopter in the UK and the Kiowa light observation helicopter in the US Army. The Lynx is mounted with TOW missiles and the Kiowa Warrior can be mounted with Hellfire missiles, rockets and .50 calibre guns. These add on weapon systems create a multi role use for these helicopters as well as additional effective firepower to the land force commander.

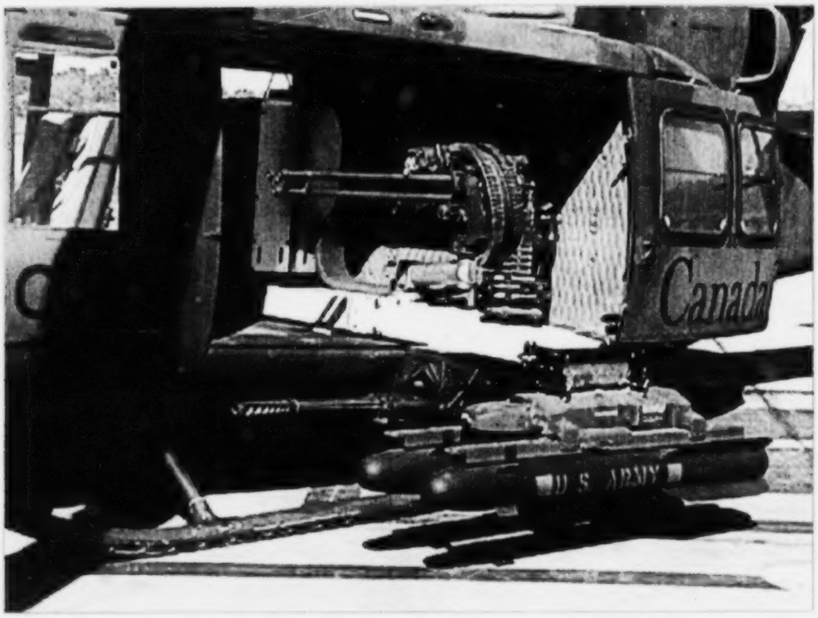

Figure 5-3. Example of Add On Weapons Systems

9. **Armed Recce Helicopters (ARHs).** The original intent of aviation was to conduct the reconnaissance role by means of a recce or a Light Observation Helicopter (LOH). The LOH would locate targets for armed or attack helicopters to engage. The attack helicopters of the day, such as the Cobra, had very limited target acquisition equipment and engagement distances were limited to 4 km. Advances in technology and helicopter design allowed the attack helicopter to have a much better sensor suite. This, combined with a longer weapons engagement range of 8 km, led to decreased use of the LOH. With the Longbow Apache, and subsequently with the Comanche, the LOH recce role is accomplished by the attack helicopter itself. The ability to detect and engage targets with one platform has led to the creation of Armed Recce Helicopters (ARHs) and Recce Attack Helicopters (RAHs).

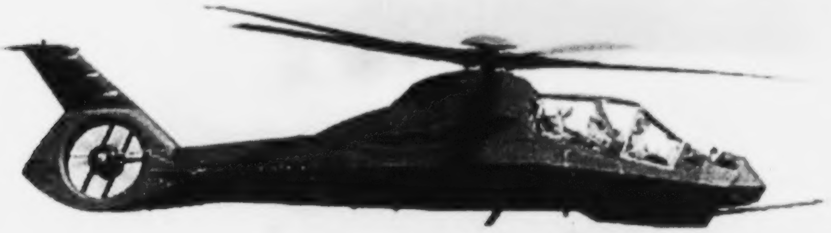

Figure 5-4. RAH 66 Comanche

ATTACK HELICOPTERS

10. **General**. Canada does not possess attack helicopters. The requirement for AH support in coalition operations is provided, if available, by other coalition countries. In order to know how AHs operate and how to employ them, attack helicopter doctrine is detailed in this chapter. Since AH training and operations will most likely occur in conjunction with US Army Aviation resources, their doctrine for the employment of AHs is the basis for the following doctrine.

US ARMY AVIATION AH ORGANIZATIONS

11. **AH Fundamentals**. The basic US Army aviation unit for attack helicopters is the Attack Helicopter Battalion (AH Bn). AH Bns are assigned to divisional aviation brigades and corps AH Regts. They provide the supported comd with a highly mobile and lethal anti-armour, anti-personnel, and anti-materiel capability during day and night operations.

12. **Heavy Division**. There are two AH Bns per heavy division. Each battalion has AH 64 Apaches, equipped with 24 attack helicopters (three companies of eight each). The three AH Coys provide the AH Bn with an anti-armour, anti-personnel and anti-materiel capability. The AH bn commander may task organize the company to accomplish the mission. With eight helicopters per AH Coy, six helicopters should be available for missions, based on a 75 percent serviceability rate. The two plane "lead-wingman" section provides a high degree of task organization options, mission flexibility, and mutual support between sections.

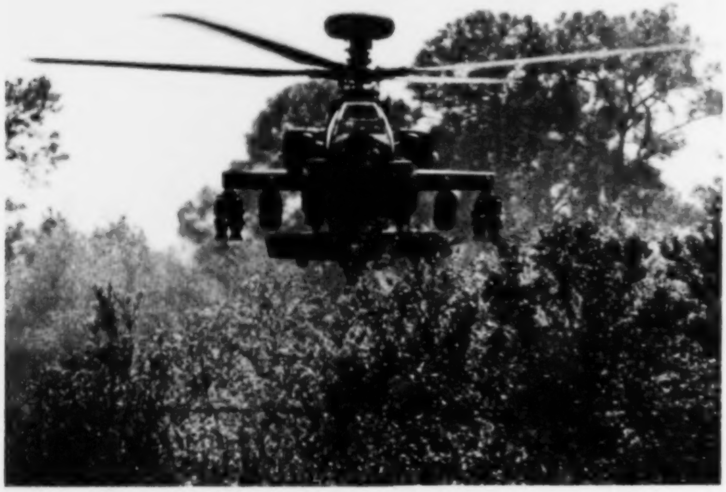

Figure 5-5. AH 64D Apache Longbow

13. **Light Division**. The light division has one AH Bn organized the same as the heavy division (three AH Coys) except that the light division is equipped with OH 58D Kiowa Warriors.

14. **Corps AH Regiment**. The AH Regt of the corps aviation brigade is normally allocated three AH 64 equipped bns. The AH bn is organized the same way as it is in the heavy division.

US ARMY AVIATION AH DOCTRINE

15. **General**. US Army aviation doctrine states that success on the battlefield depends on how well the tenets of Army operations doctrine are applied. These tenets are as follows:

a. **Initiative**. Attack helicopters are offensive weapon systems. They provide commanders the means to deliver massed firepower rapidly and accurately, thus disorganizing enemy forces and allowing the friendly force to gain or maintain the initiative. To be successful, the AH Bn must be integrated into land force commander's concept of operations. This requires that commanders analyze the battlefield and decide early where the AH Bns are employed;

b. **Depth**. The AH Bn can attack enemy forces anywhere on the battlefield. Commanders must see and use the entire battlespace to strike the enemy to prevent the concentration of forces at a point of its choice. The speed with which attack helicopters can mass fire power at chosen points in the battlespace allows the land force commander to influence the battle to a depth that would otherwise be beyond reach;

c. **Agility**. The mobility and flexibility of attack helicopters expands the reach of commanders to all areas of the battlefield. Terrain provides cover and concealment for attack helicopters just as it does for armour and infantry; however, it does not limit the mobility of the helicopter. The AH Bn can attack the enemy's flanks and rear, thus providing ground forces the time to manoeuvre and engage enemy forces from directions where they are most vulnerable;

d. **Synchronization**. To survive and succeed on the battlefield, the AH Bn must fight as an integrated member of the combined arms team. In combat, the fire of other attacking weapons enhances the firepower of the attack helicopter. This combined attack strengthens the total force by overcoming limitations found in each weapon system. As a result, total combat power is increased and survivability is improved. When the enemy is simultaneously faced with an array of armour, infantry, artillery, CAS, and attack helicopter units, it can no longer concentrate on countering a single set of weapons from one direction at a time. Rather, it is attacked throughout its depth with a variety of weapons; and

e. **Versatility**. On the modern battlefield, the tempo of the fight is rapid, violent, and extremely fluid. The AH Bn's primary mission is the destruction of enemy armour or mechanized forces. The AH Bn, however, must be prepared to conduct reconnaissance and tactical security operations. Additionally, in OOTW, a subversive or less distinguishable enemy may require the AH Bn to provide direct or indirect fire, in direct support of friendly ground forces operating in an urban environment. While the AH Bn can react quickly, it requires as much mission planning time as other land force manoeuvre battalions.

16. **Framework of the Battlefield**. An AH Bn can conduct deep, close, and rear operations during offensive and defensive operations. Conducting deep operations allows corps and division commanders to influence close operations before the enemy closes with friendly forces. During the conduct of close operations, an AH Bn allows corps and division comds to weigh their main effort and brigade commanders to attack the enemy in depth. An AH Bn also gives corps and division commanders the ability to mass combat power rapidly against enemy ground penetrations and large airborne or heliborne assaults into the corps or divisional rear areas.

17. **Attack Helicopters in Combat Operations**. With the AH Bn commander's assistance, the land force commander determines where the AH Bn is used best. From the land force commander's mission and intent, the AH Bn commander determines how the battalion is employed. Some of the land force commander's options for employing the AH Bn are:

a. to attack massed armour or light forces;

b. to attack in depth to extend the influence of the force;

c. to dominate avenues of approach;

d. to reinforce ground forces by fire;

e. to mass to defeat enemy penetrations;

f. to attack to protect the flanks of a moving or halted friendly main body;

g. to provide security for the movement and passage of lines by land forces;

h. to conduct reconnaissance; and

i. to perform search and attack missions.

18. **Offensive Operations**. The AH Bn gives the manoeuvre commander a viable force that can rapidly concentrate firepower at the decisive time and place. AH Bns can act as part of the main attack force by conducting deliberate attacks. They can also conduct supporting attacks by cutting off enemy reinforcements and acting as part of the reserves, ready to weigh the main effort and to exploit success.

19. **Advance to Contact**. The advance to contact is used to gain or re-establish contact with the enemy. It may be used when contact with the enemy has been temporarily lost, or it may be used to initiate an attack. An advance to contact helps develop the situation and maintain freedom of action. During an advance to contact, the AH Bn operates with land forces and is critical to the success of the lead elements and the main body. An advance to contact often results in a meeting engagement, that is, forces engage each other by chance rather than by design. As part of the covering force or guard, the AH Bn can destroy forward enemy elements identified by reconnaissance or land forces. The mobility and firepower of the AH Bn permits the main body to overwhelm the enemy and maintain the initiative.

20. **Attack**. The two types of attacks for attack helicopters are the hasty attack and the deliberate attack. Each is discussed in the paragraphs that follow:

a. **Hasty Attack**. A hasty attack is an operation for which a unit has not made extensive preparations. It is conducted with the resources immediately available to maintain momentum or take advantage of the enemy situation. For attack helicopters, a hasty attack is made on an enemy force to retain the momentum of the entire force. Hasty attacks conducted by the AH Bn are made with the foreknowledge of where the engagement areas (EAs) and battle positions (BPs) are located. The exact time, EA, and the threat to be encountered during the attack, however, are not known until shortly before the mission; and

b. **Deliberate Attack**. A deliberate attack is conducted against an enemy that is well organized and cannot be turned or bypassed. It is planned and carefully coordinated with all concerned elements. The deliberate attack is based on a thorough reconnaissance, an evaluation of all available intelligence and relative combat strength, an analysis of various courses of action, and other factors affecting the situation. To conduct a successful deliberate attack, the AH Bn is integrated with the overall force concept of ops. The AH Bn provides mobile and flexible combat capability and can execute contingency plans as well as attacks that support the main effort. During a deliberate attack, the AH Bn can conduct attacks on enemy facilities and on counterattacking or withdrawing enemy forces.

21. **Exploitation**. An exploitation usually follows a successful attack and is made to take advantage of weakened or collapsed enemy defences. It prevents the enemy from reorganizing a defensive system or conducting an orderly withdrawal. An exploitation can also be conducted to secure deep objectives. During an exploitation, an AH Bn is employed as part of a larger force. The AH Bn strikes the enemy's flanks and rear areas, disrupting its withdrawal and attempts to reorganize. The AH Bn operates as in an advance to contact by following the land forces and is prepared to conduct hasty attacks on counterattacking and withdrawing enemy forces. The AH Bn can also conduct deep operations to further disrupt the enemy.

22. **Pursuit**. A pursuit is an offensive operation taken after a successful attack or developed during an exploitation. The pursuit takes advantage of enemy weaknesses and its inability to establish an organized defence. As the enemy attempts to disengage, friendly forces maintain pressure in an attempt to destroy the enemy force. A pursuit requires unrelenting pressure, speed, mobility, and firepower to complete the enemy's destruction. As land forces attempt to maintain contact and flank the enemy, the AH Bn and air assault forces can manoeuvre deep to cut off the enemy as it attempts to withdraw. The AH Bn and airmobile forces also can block entry to relieving enemy forces.

23. **Defensive Operations**. A successful defence requires active and passive elements working together to regain the initiative. The objective of a defensive operation is to cause the enemy attack to fail; preserve the force, facilities, and installations; control key terrain; gain time; or concentrate forces elsewhere. Other objectives may be to retain captured terrain and degrade enemy forces so offensive operations can be resumed. The AH Bn normally participates in two types of defence, the area defence and the mobile defence, described as follows:

a. **Area Defence**. AH Bns normally conduct an area defence when directed to defend specified terrain, when the enemy enjoys a mobility advantage over the defending force, when well defined avenues of approach exist, and the defending force has sufficient combat power to cover the likely enemy avenues of approach in sector. The orientation of the area defence is to deny the enemy designated terrain. Manoeuvre within an area defence usually consists of repositioning between defensive positions or within sectors and counterattacks. A perimeter defence is a form of area defence, oriented in all directions; and

b. **Mobile Defence**. AH Bns conduct a mobile defence by allowing the enemy force to advance to a point where it is exposed to a decisive attack by a striking force. The end state of the mobile defence is the destruction of the enemy force. The commander conducts a mobile defence by organizing his force into two subunits: a fixing force and a striking force. The fixing force shapes the penetration or contains the enemy advance, while the striking force conducts the decisive attack.

24. **Deep Operations**. Deep operations are operations that must be executed with the utmost care, coordination and planning. Deep operations are activities directed against enemy forces that currently are not engaged but that could influence division or corps close operations within the next 24 to 72 hours. Deep operations occur during both friendly offensive and defensive operations. The AH Bn conducts deep operations at the corps and divisional levels. Deep attacks by corps AH Bns help the corps commander to shape the battlefield and set the terms for close operations. Deep attacks conducted by divisional AH Bns help the division commander to shape the battlefield and are used to allow defending manoeuvre brigades to engage the enemy throughout its depth. The AH Bn itself is a high value/high payoff target. To send it deep requires the recognition that the target is worth the expenditure of the AH Bn and the combat support elements that it takes to accomplish the mission. Coordination is a key factor to success. During Desert

Storm, AH deep ops required real time red SA from JSTARS, SEAD from CAS, CSS coordination to set up and resupply FARPs, MTH support to move FARPs and target designation from special forces teams in the target areas.

25. **Close Operations**. The AH Bn may be part of the larger force's security operation as a member of a covering force. Because of the speed and flexibility of the AH Bn, it can rapidly concentrate combat power throughout the covering force area. Employed well forward, it operates out of Forward Assembly Areas (FAAs) in the rear of the covering force area. At corps level, the AH Bn may be attached or placed OPCON of armoured recce regiments to increase their long range anti-armour capability. At divisional level, the AH Bn is the primary long range anti-armour weapon system.

26. **Main Defensive Area Operations**. Once the fight has moved into the main defensive area, the land force commander uses the AH Bn against the enemy's main effort. The land force commander commits the AH Bn at a decisive place to exploit success or ensure accomplishment of the mission. Using an AH Bn during the defence often comes as part of a counterattack. The AH Bn counterattacks along with other manoeuvre forces to strike the enemy throughout the depth of the battlefield and help the force to seize the initiative.

27. **Other AH Engagements**. The AH Bn can also be used for the following purposes:

a. **Attacking enemy depth battalions and regiments**. While ground units engage the enemy from battle positions where they can engage the leading elements of the enemy attack, the AH Bn manoeuvres to attack the enemy's follow-on battalions and regiments simultaneously, throughout its depth;

b. **Massing to defeat enemy penetrations**. AH Bns attack enemy penetrations along with other manoeuvre forces to defeat them and restore the FLOT. While other manoeuvre forces attack the lead elements of the penetration, the AH Bn attacks the penetration in depth, denying the enemy comd the opportunity to mass, bypass, or withdraw. Once the enemy is encircled, the AH Bn can attack enemy breakouts or any other forces that may attempt to relieve the encircled enemy force; and

c. **Attacking to defeat enemy flanking forces**. The AH Bn can be used to dominate avenues of approach into the rear and flanks of friendly forces. The AH Bn reinforces the flank screen or guard to defeat the threat to the flanks of the main body.

28. **Rear Area Operations**. Rear area operations are conducted to assure freedom of manoeuvre and operational continuity from the corps rear boundary forward to the rear boundaries of committed manoeuvre units. AH Bns, along with land forces, may be given immediate missions to act as rapid reaction forces for incursions into brigade, division, or corps rear areas. The AH Bn can rapidly react to enemy heliborne or airborne operations into the friendly force's rear area. The AH Bn should attempt to attack the enemy force in its assembly area or just as it arrives in its LZ. The AH Bn is

especially valuable in rear operations when the enemy has air landed or air dropped light armoured vehicles. Once the enemy force has dispersed, the AH Bn becomes less effective in the fight. Major mechanized incursions into the rear area are attacked in the same manner as they are during close or deep operations. The AH Bn attacks until the force commander can respond with additional forces to defeat the penetration. During rear area operations, coordination between field artillery, Air Defense Artillery, CAS, and AH Bns must be accomplished by LOs working in the divisional and corps headquarters.

29. **CF Organization Equivalents**. In order to alleviate the need to compare US and CF organizational equivalents for the remainder of this chapter, the CF Avn organizational equivalents are substituted, when practicable, based on the following table:

	US Avn Org	CF Avn Equivalent	CF Example	Provides Sp to
a.	Brigade	Group	10 TAG	Corps
b.	Regiment	Wing	1 Wing	Division
c.	Battalion	Squadron	408 THS	Brigade (Gp)
d.	Company	Flight	B Flight	
e.	Platoon	Section	2 X CH 146	

ROLES OF THE AH SQUADRON

30. **General**. The AH Sqn is an aerial manoeuvre unit. It conducts attack, reconnaissance, and security operations that complement other manoeuvre forces. The AH Sqn enables the supported land force commander to mass fire power rapidly at the decisive time and place to affect a battle's outcome. The land force commander integrates the AH Sqn into the tactical manoeuvre plan with other manoeuvre units. When employed with other combat assets, the AH Sqn can strike the enemy where and when it is most vulnerable.

31. **Mutual Support**. An AH Sqn never fights alone. Attacks are coordinated with other manoeuvre, combat support, CSS, and joint forces to form a combined arms team. This team surprises and overwhelms the enemy at the point of attack. Attacks may be conducted out of physical contact with other friendly forces but synchronized with their concept of operations, or they may be in direct contact with friendly forces.

AH CAPABILITIES

32. **General**. The AH Sqn and other aviation assets dominate the third dimension of the battlespace. This provides an invaluable manoeuvre capability to the land force commander. The capabilities of an AH Sqn are as follows:

a. **Mobility**. AHs fully exploit all dimensions of the battlespace;

b. **Speed**. AHs move across the battlefield at speeds in excess of 3 kms per minute. Typical planning airspeeds are 100 to 120 knots during daylight and 80 to 100 knots at night. Speeds during marginal weather are reduced commensurate with prevailing conditions;

c. **Range**. The AH Sqn can attack targets up to 150 km across the FEBA. If greater depth is required, additional fuel tanks can extend the range with a corresponding reduction in weapons carrying capacity;

d. **Versatility**. The firepower available to the force commander is increased but the employment concepts of the AH Sqn remain the same. In a pure AH sqn, the traditional recce and attack missions are no longer aircraft dependent. During the planning process, the AH Flt Comd task organizes assets and designates specific helicopter mission responsibilities. There is flexibility to maintain the traditional recce-weapon team employment concept or focus assets as a pure AH force; and

e. **Lethality**. The weapons carried on AHs may vary to meet specific mission requirements. Examples of AH weapons systems can be found at Annex A to this chapter.

LIMITATIONS

33. **Weather**. Although fully capable of operating in marginal weather, attack helicopter capabilities are seriously degraded in conditions below a 500 foot ceiling and visibility less than 3 km. Because of the Hellfire missile's trajectory, ceilings below 500 feet require the attack helicopter to get too close to the intended target to avoid missile loss. Below 3 km visibility, the AH is vulnerable to enemy Air Defence Artillery systems. The Hellfire 2, since it uses radar for target identification and acquisition, is not affected by clouds.

34. **AH Sqn FARP Requirements**. Helicopters consume large amounts of fuel, ammunition, and repair parts and require a CSS distribution system across the entire battlefield. An AH Sqn normally employs two FARPs (each one to completely refuel and rearm one squadron); one active for that specific mission, and the other moving to or setting up in a new location for future operations. (See Chapter 10 for FARP operations).

MISSION

35. The primary mission of an AH Sqn is to destroy enemy forces using fire and manoeuvre. To accomplish this mission the AH Sqn attacks the enemy to destroy, attrit, disrupt, or delay. The AH Sqn is **most effective against massed, moving targets, identified and confirmed** and **least effective against enemy forces in prepared, well camouflaged positions**. Without the support of land manoeuvre forces, the AH Sqn cannot conduct missions that require the occupation of terrain. They can, however, deny the enemy terrain for a limited time by dominating it with direct and indirect fire.

36. **Mission Statement**. The mission statement must include a concise "why" to fully define success. Given the wide variety of potential enemies and potential theatres of operations, the AH Sqn commander must base the unit's mission statement and end state on a thorough IPB. The commander must also articulate an endstate that is understandable and can be quantified on the battlefield. The following are examples of the "what" in the AH Sqn's mission statement:

a. attack to destroy;

b. attack to attrit;

c. attack to delay;

d. attack to disrupt;

e. conduct reconnaissance;

f. provide tactical security; or

g. defend.

COMMAND RELATIONSHIPS

37. The normal command relationship of an assigned AH Sqn in a coalition operation is OPCON. The AH Sqn is OPCON to the gaining formation or unit when the squadron is to be used for a specific mission or the effective time of the relationship is short. Normally, control of the AH remains with the Aviation Group or AH Wing and shifts to other groups as an allocation of aviation support by division and corps headquarters. When the mission is completed, the AH Sqn returns to the control of its parent group or AH Wing.

OPERATIONAL TERMS AND DEFINITIONS

38. **Assembly Area**. An assembly area is a location where the AH Sqn prepares for future operations, issues orders, accomplishes routine maintenance, and completes re-supply activities. The squadron main CP is located in or near the assembly area. Assembly areas should be located out of enemy artillery range and be large enough for dispersion of the unit. Assembly areas are normally located in the corps or division rear area. However, corps and division aviation assets are normally dispersed over large areas to preclude their becoming lucrative targets. Assembly areas are not located along an axis of advance. Other considerations involved in selecting appropriate assembly areas are:

a. security;

b. concealment;

c. accessibility to MSRs;

d. air avenues of approach;

e. location of friendly units; and

f. suitability of in and out routes.

39. **Forward Assembly Areas**. An AH Sqn occupies FAAs for extended periods while awaiting orders to execute missions. FAAs are located near the controlling HQ to improve command, control, communications and intelligence response times. The FAA should be located out of range of enemy medium artillery. Limited maintenance

personnel may be located in the FAA as they move forward to repair aircraft. Considerations for selecting FAAs are the same as those for selecting assembly areas.

40. **Holding Area**. A Holding Area (HA) is a covered, concealed position that is occupied for short periods. Occupation of an HA allows for final reconnaissance and coordination of assets by the AH Flt Comd. It is located between the FAA and the objective area. While occupying an HA, helicopters may be hovered or landed but they are not shut down. AHs should consider moving to an alternate HA or returning to the FAA if they have to wait longer than a few minutes. Units that occupy HAs should ensure that:

a. helicopters maintain operating RRPM;

b. crews maintain radio listening silence;

c. separate HAs are established for each Flt;

d. helicopters remain at NOE altitudes at and near the HA;

e. helicopters establish positions that provide 360 degree security;

f. the HA is terrain masked and free of sources of rotor wash signature;

g. copilots dismount for face to face coordination with the AH Flt Comd and recce helicopter aircrew; and

h. helicopters are dispersed and maintain section/flight integrity while keeping intervisibility for security.

41. **Attack Routes**. AHs move from the HA via attack routes. Properly selected attack routes allow attack helicopters to move undetected, ensuring initial surprise in the attack. Recce hels select attack routes that provide cover and concealment and have prominent terrain features to assist in navigation. When used properly, vegetation and various terrain features can reduce helicopter noise and decrease the possibility of detection. AH Flts may have multiple in and out routes.

42. **Attack By Fire Position**. If the enemy situation is vague, as in a movement to contact, and the AH Sqn CO has been assigned a sector, Attack By Fire (ABF) positions may be used. An ABF position is one from which a unit engages a target, without manoeuvring over it, with the intent of inflicting some level of damage. ABF positions are less restrictive than BPs, and better suited to a fluid battlefield. The CO must, however, control all indirect fire into the sector and know the locations of all sqn AH Flts to clear them.

43. **Support By Fire Position**. The Support By Fire (SBF) position is normally used in conjunction with the ABF position, as a base of fire or overwatch position. It can be used to engage a target while ground or air assets move to or around it. Engagements from the SBF position may range from suppression to destruction of the target, but the primary mission is to fix the target so another force may manoeuvre.

44. **Firing Position**. AH pilots select the actual firing positions that provide the optimal standoff distances and good fields of fire within their BP, ABF, or SBF. In and out routes should be well concealed, and the background of the firing position should reduce the risk of visual acquisition by the enemy. Selected firing positions must also allow freedom of movement for the attack helicopters and permit them to hover without raising dust or debris. To increase aircraft survivability, attack helicopter aircrew should limit the number of engagements from a single firing position and move before they receive effective counterfire.

45. **Engagement Area (EA)**. The EA is an area in which the land force commander intends to trap and destroy an enemy force with the massed fire support of all available weapons. Selection of the EA begins with the IPB process. From this, the most likely and most dangerous enemy course of actions is derived. These most likely enemy corridors of advance are then combined with the best friendly terrain which maximizes obstacles, stand off distances, enemy exposure, firing positions, and fire support to provide the optimum coordinated fires and mass to engage the enemy force as it arrives in the EA. The G2, G3, G3 Avn and an AH Sqn LO are all involved in the planning and selection of EAs, for approval by the land force commander. A good EA should have at least the four characteristics listed below:

a. **Battle Positions (BPs)**. The EA should have several BPs for attacking the enemy from various directions;

b. **Obstacles to Movement**. Obstacles, either natural or man made, are desirable in the EA to slow target movement and permit the effective use of direct and indirect fire;

c. **Long Range Fire**. To enhance aircraft survivability, an EA should allow aircrew to engage targets at the maximum range that permits a high kill potential; and

d. **Continuous Target Visibility**. Long range engagements require that the target be in view during terminal guidance. As a rule, EAs should provide an unobstructed view of the target from firing or designating positions. Planning should concentrate on sensor ranges, not weapon maximum standoff ranges, for EAs.

AIRCREW ROLES AND RESPONSIBILITIES

46. **General**. The AH Sqn is a versatile organization that can conduct offensive operations (attack, movement to contact), defensive operations (area defence, mobile defence), reconnaissance, and security. In addition, the AH Sqn can conduct special purpose operations such as airmobile security (an advance guard that is a combination of attack, reconnaissance, and tactical security).

47. **Recce Helicopters**. The mission of the recce hel section(s) supporting the AH Flt is to see the battlefield, find the enemy, coordinate its destruction, and provide security against ground and air threats. Normally, recce hels in each task organized grouping accomplish the recce tasks; however, both the recce and the attack aircrews

must be able to perform them. Regardless of which aircrew is performing the mission, the recce tasks must be performed. These tasks include:

a. requesting and adjusting indirect fire;

b. requesting and controlling CAS aircraft;

c. providing early warning and confirming the BPs;

d. coordinating operations and developing the enemy situation;

e. assisting the AH Flt Comd in controlling Joint Air Assault Teams (JAAT) operations;

f. assisting with the movement of attack helicopters to the BPs;

g. designating targets for acquisition and engagement by laser guided munitions;

h. handing over targets verbally or digitally;

i. maintaining enemy contact as attack helicopters move between BPs;

j. acquiring, identifying, reporting, and designating targets;

k. providing attack helicopters with local security and protection from air threats while they engage targets; and

l. assisting AHs by confirming or selecting firing positions that provide good concealment and safe standoff distances from AAAD weapon systems.

48. **AHs**. AHs destroy enemy forces and their supporting systems. Regardless of which aircrew is performing the mission, the AH crew:

a. coordinates with the recce section;

b. moves to the BP, selects the firing position, and receives the target handover from the AH Flt comd or the recce section lead;

c. acquires and engages targets;

d. moves to an alternate position and reengages; and

e. moves to a successive or supplementary position or HA or returns to the FARP.

EMPLOYMENT METHODS

49. **General**. The AH Sqn CO employs the squadron through the coordination of the AH Flts, CS, and CSS, and uses AH Flts to destroy enemy forces. To do this, one of three methods of employment is utilized; continuous attack, phased attack, or maximum destruction. Timing is critical in the employment of the AH. Employed too early, it may have to be disengaged before mission completion because of low fuel. Employed too late, it may miss part or the entire targeted unit and fail to destroy the enemy forces at the critical time and place. The AH Sqn should only be **employed when a lucrative target** has been identified and selected for engagement.

50. **Continuous Attack**. To exert constant pressure on the enemy force, the AH Sqn commander employs the AH Flts using the continuous attack method. This method ensures that at least one flight is in the battle at all times. While one flight is in the battle, the other two prepare to relieve the engaged flight as they remain in HAs or the FARP or move between the FARP and the battle. Many times during a continuous attack the AH Flt Comd on station may send only the AHs to rearm and refuel. This allows the recce hels to remain in enemy contact, coordinate with the relieving AH Flt Comd, and reconnoitre successive BPs. Multiple BPs, ABF positions, or SBF positions selected during mission planning provide the flexibility needed for a coordinated battle handover between flights. The continuous attack method provides the most flexibility and the most efficient FARP operations. It also provides sustained helicopter fire support over long periods.

51. **Phased Attack**. The phased attack method is a modification of the continuous attack method and is used to increase the initial firepower of the squadron. Using this method, the CO initially employs one flight to begin the attack and then quickly phases in the second flight from a different BP. The third flight is phased into the fight when either of the other flights is low on fuel or ammunition. The phased attack method may be reversed, or the commander may vary how the phased attack is conducted. For example, one flight may be employed to set up the fight and then exploit the attack with the other two flights. If the phased attack method is used, helicopter turnaround times in the FARP must be kept as short as possible. Because of FARP limitations, eventually the phased attack method reverts to the continuous attack method.

52. **Maximum Destruction**. If the land force commander wishes to place as much combat power as possible into the battle, the maximum destruction method is used. To overwhelm the enemy with massed fire, the squadron deploys with all three flights in contact from different positions. In this situation, the supported commander must realize that the AH Sqn will be out of the fight for 20 to 90 minutes at the completion of its initial attack. The exact time depends upon the distance to the FARP and the time it takes to replenish fuel and ammunition after the initial engagement.

AH SUPPORT TO URBAN OPERATIONS

53. Attack helicopters can be employed in Urban Operations. However, there are special planning considerations for this type of employment. Fields of fire are restricted and buildings provide cover for enemy light forces to engage attack helicopters with near impunity. This type of environment can negate the effectiveness of the long range, precision munitions of the attack helicopter. Rockets and cannons can be used against light structures; however, they may not have sufficient explosive power to be used against well constructed buildings of reinforced brick and concrete. While there are challenges for comds employing attack helicopters in urban environments, experience has shown that attack helicopters are much more effective and flexible than mortars and artillery in urban operations. The AH Sqn is well suited for employment on the outskirts of an urban area, attacking forces that are attempting to bypass, envelop, or reinforce the built up area. If employed in urban terrain, special consideration should be given to the munitions selected. Collateral damage near targets engaged by Hellfires will be higher

than near those engaged by 30 mm rounds. Consideration should also be given to high energy, high altitude tactics, such as diving fire, to overcome the vertical restrictions of urban terrain.

AH SQN COMBAT SERVICE SUPPORT

54. **General**. Successful AH Sqn operations depend on close staff coordination. The squadron staff must anticipate and coordinate AH Sqn CSS with higher echelon CSS.

55. **Planning**. Combat operations and CSS planning must be conducted at the same time. Successful AH Sqn combat operations require timely reports that reflect the CSS status of the squadron. Unlike other manoeuvre forces, the AH Sqn can be employed anywhere within the division's or corps' area of operations. The AH Sqn coordinates its support through the aviation group to the COSCOM/DISGP. To ensure the availability of CSS, the COSCOM/DISGP, the aviation group, and the AH Sqn COs must maintain close coord.

56. **Coordination**. Depending on the environment and the mission, AHs require fuel and ammunition re-supply after every 1 1/2 to 2 hours of continuous operations. The squadron staff must forecast support requirements based on the expected duration of the mission. Requirements are processed through the aviation group staff and then sent to the COSCOM/ DISGP. The COSCOM/ DISGP staff directs support to the AH Sqn from the appropriate COSCOM/ DISGP unit.

AH 64A AND AH 64D

APACHE CHARACTERISTICS

AH 64A

1. **Description**. The AH 64A is a twin engine, tandem seat, four bladed attack helicopter. With its crew of two, the pilot occupies the rear seat and a copilot/gunner occupies the front seat The helicopter is approximately 58 feet long with a 48 foot main rotor span. The maximum gross weight is 21,000 pounds. The maximum airspeed (level) is 164 knots and normal cruise speed is 100 to 120 knots.

2. **Capabilities**. The AH 64A has the following capabilities:

   a. day, night, and limited adverse weather fighting capabilities;

   b. combat survivability;

   c. a wide array of firepower options; and

   d. can be configured with an external 230 (US) gallon fuel tank to extend its range on attack missions, or it can be configured with up to four fuel tanks for ferrying/self-deployment missions.

3. **Other performance factors**:

   a. the combat radius of the AH 64 is approximately 150 kms*;

   b. the combat radius with one external 230 gallon fuel tank installed is approximately 300 kms*;

   c. the AH 64 is air transportable in the C-5, C-141 and C-17;

   d. an onboard video recorder has the capability of recording up to 72 minutes of either the pilot or CPG selected video. It is an invaluable tool for damage assessment and reconnaissance;

   e. the Apache's navigation equipment consists of a doppler navigation system, and a GPS receiver;

   f. the Apache has state of the art optics that provide the capability to select from three different target acquisition sensors. These sensors are:

      (1) **Day TV**. It views images during day and low light levels, black and white,

      (2) **TADS FLIR**. It views thermal images, real world and magnified, during day, night and adverse weather, and

      (3) **DVO**. It views real world, full colour, and magnified images during daylight and dusk conditions.

***Note**: Both radii are temperature, PA, fuel burn rate and airspeed dependent.

4. **Armament Systems**. The Apache has four articulating weapons pylons, two on either side of the helicopter, on which weapons or external fuel tanks can be mounted. The helicopter has a laser range finder designator. This is used to designate targets for the Hellfire missile system as well as provide range to target information for the fire control computer's calculations of ballistic solutions. A description of each system follows:

a. **the M230A1 "Chaingun" 30mm cannon**:

(1) used primarily against soft skinned and lightly armoured targets, and for self-protection,

(2) single barrel, externally powered, hydraulically driven turret,

(3) maximum capacity: 1200 rounds; rate of fire: 600 to 650 rounds/minute,

(4) maximum range: 4,000 meters; maximum effective range: 1500 to1700 meters, and

(5) ordnance: M789 HE, dual purpose ammunition;

b. **the FFAR System, 70mm**:

(1) the maximum range is 9,000 meters; the most effective range is 3,000 to 4,000 meters,

(2) ordnance: HE, HE MPSM, white phosphorus, illumination, and flechette, and

(3) maximum load: 76 rockets; and

c. **the Hellfire Missile System**:

(1) the Hellfire is a laser guided missile capable of defeating any known armour,

(2) there are two types of engagements:

(a) the first type of engagement is autonomous. The helicopter that fires the missile also provides the laser energy for the missile,

(b) the second type of engagement is remote. The missile is fired from one helicopter, but the required laser designation is provided by another AH 64, a ground laser designator, or an OH 58D, and

(c) the designating crew may offset a maximum of 60 degrees from the gun to target line and must not position their aircraft within a 30 degree safety fan from the firing helicopter,

(3) the minimum range is 500 meters,

(4) the maximum range is 8,000 meters, and

(5) the maximum load per helicopter is 16 missiles.

AH 64D APACHE LONGBOW

5. **General**. The AH 64D Longbow is the latest upgraded version of the Apache. It can easily be identified by the mast mounted radome, which houses the detection portion of the Fire Control Radar System. It is through this system that one Apache, with one exposure can sweep of the battlefield ahead, and identify up to 1,000 targets. From these 1,000 targets, the onboard computer will classify the targets by types (i.e. wheeled vehs, tracked vehs, air defence vehs, helicopters or fixed wing) and prioritize up to 256 the most dangerous targets. This target information is then downloaded by a secure data modem to other Longbows in the attack team and divided amongst the team members. This target data is then programmed into each Hellfire 2 missile.

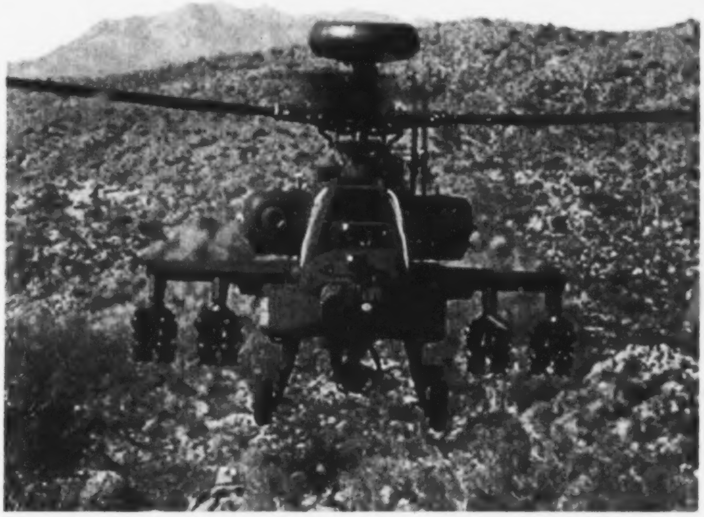

Figure 5A-1. AH 64D Apache Longbow with Hellfire 2 Missiles

6. **Hellfire 2**. The Hellfire 2 missile has a nose mounted RF seeker which will home onto the target identified by the primary radome sweep. It is a fire and forget weapon. It will actively seek the target and can be programmed for secondary missions, if the primary target cannot be identified. This whole sequence takes less than 30 seconds from the radome sweep to launch of the missile(s). As well, all missiles can be launched simultaneously. If there are two flights of Longbows in the attack team, these sixteen helicopters could launch all 256 Hellfires simultaneously.

7. **Information gathering package and information sharing**. The Longbow sensor package includes the Target Acquisition Designation Sight (TADS), the Fire Control Radar (FCR), TV, FLIR, direct view optics and millimeter wave radar. The Longbow is capable of sending and receiving target information as part of an ISTAR team of battlefield information gathering systems. For example, it can interchange target data with JSTARS aircraft, CAS aircraft and artillery.

8. **Capability**. The Longbow is the most advanced and lethal AH in the world, entering the 21st Century. Its performance was regarded by the US Army as a quantum improvement over existing systems. Its outstanding capability as an armed recce helicopter is the main reason that all 750 US Army AH 64A model Apaches are being upgraded to D models and why 67 of these AHs are being produced in the UK by Westland Helicopters as the WAH 64. In addition to Hellfire missiles, the Longbow is also capable of carrying four air to air missiles, mounted on the wing tips.

CHAPTER 6

COMBAT AIRLIFT

GENERAL

1. Combat airlift operations normally involve the use of Utility Tactical Transport Helicopters (UTTHs) and sometimes Medium Transport Helicopters (MTHs) to provide land force commanders with the ability to rapidly move combat forces, supplies, and equipment virtually anywhere within their area of operations.

2. Combat airlift operations are not conducted in direct contact with the enemy and may or may not include other members of the combined arms team. Although the concepts discussed below are focused on combat operations these missions are common to OOTW. Combat airlift missions include:

   a. airmobiles (see Chapter 7);
   b. re-positioning combat forces on the battlefield;
   c. tactical insertion;
   d. tactical logistic re-supply;
   e. movement of equipment (internal); and
   f. slung loads (external).

MISSIONS

3. **Re-positioning Combat Forces On The Battlefield.**

   a. **Large Troop Movement**. Aviation can be assigned missions to move units on the battlefield for the purpose of re-positioning forces. The transport of large numbers of troops should be planned utilizing the same principles as if it were an airmobile mission. The difference is that in these air movement missions, the force is not being moved into an area where engagement with enemy forces is likely. It therefore does not utilize all of the combined arms assets that would be included in an airmobile operation; and

   b. **Passenger Transport**. This mission differs from large troop movements in that passenger transport missions normally are accomplished by one or two helicopters. This also differs from a C&L mission because the passengers have no command or liaison function.

4. **Tactical Insertion**. Tactical insertions normally involve the insertion of special ops or advance recce troops for the purpose of recce and preparation for follow on events. This could be the case for the preparation of airmobile operations where infantry troops could be transported to an area short of the intended airmobile LZs and DZs, to ensure that theses areas are secure for the airmobile. Insertions could also be used to bring in troops with laser designators in advance of friendly air or aviation fire support. Insertion

normally is accomplished by landing the helicopter and off loading troops, but deplaning could also be accomplished by rappelling or parachute, depending on the threat and the nature of the operation.

5. **Tactical Logistic Re-supply and Movement of Equipment**. UTTH tactical logistic re-supply and movement operations normally occur from the DSA forward. (MTH logistic transport operations, which normally occur between the COSCOM and the DSA, are detailed at Chapter 8). Movement of IOR supplies and equipment on the battlefield is an important mission for utility helicopters. Speed and mobility makes UTTHs an asset for transporting priority supplies throughout the area of operations. Logistic re-supply operations are discussed below, by type of supply:

a. **Class I - Subsistence**. The UTTH cannot be expected to move large quantities of these items on the battlefield but it can be used to move priority items. It operates under division control or equal level of command to move these items from the DSA forward to the BSA and in some instances, as far forward as the battalion level. Landing zones are established at DSAs and BSAs specifically for these items;

b. **Class II - General and Technical Stores**. The probability of UTTHs having to move these items is rare, as they are not normally required on an immediate basis. One area where this may become a mission is during humanitarian assistance operations, where provision of supply to remote areas is required;

c. **Class III - POL**. UTTHs offer a limited capability for moving POL, due to all up weight restrictions. This task is normally conducted by MTHs or HLHs, which have a much greater lift capability. This function of moving aviation POL items is normally part of Forward Arming and Refuelling Point (FARP) Operations, which are described in detail in Chapter 10;

d. **Class IV - Construction and Field Defence Stores**. Land forces preparing for a defense utilize a tremendous amount of these items, in particular, wire. Helicopters can transport these supplies forward from the DSA and BSA or equivalent, where it is used for battlefield preparations. Movement by air allows for rapid preparation of defensive sectors;

e. **Class V - Ammunition**. In high tempo combat operations one can expect to expend large amounts of ammunition. Helicopters can play a role in keeping the force resupplied with ammunition, but this type of operation would normally be focused on emergency re-supply;

f. **Class VII - Major End Items**. These items are not normally found within the DSA/BSA . If required to be moved by air, MTHs or HLHs will normally move them. If of sufficient urgency and light enough to carry, UTTHs may be utilized to transport these items forward;

g. **Class VIII - Medical Material**. Transport of depleted medical supplies to forward medical facilities can be conducted by UTTH; and

h. **Class IX - Repair Parts and Components**. Helicopter resupply of IOR repair parts and aircraft spares can be accomplished quickly, both day and night.

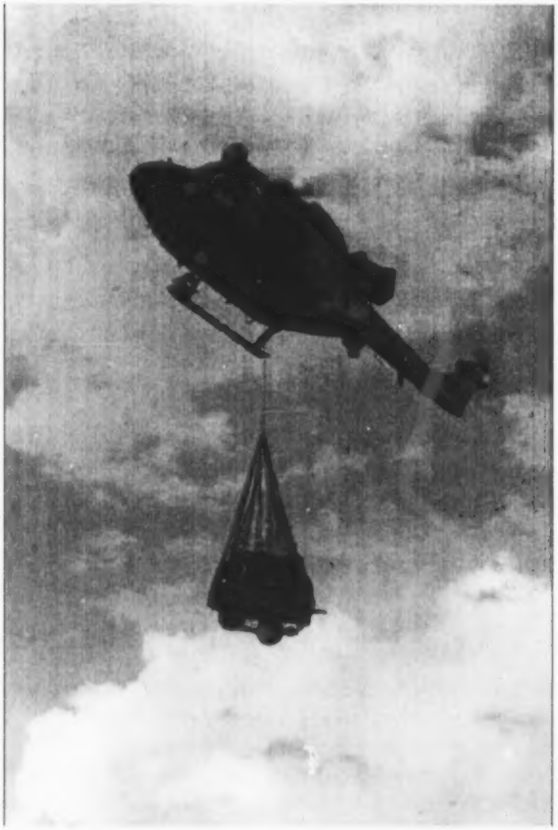

Figure 6-1. A Lynx Slung Load

6. **Slung Loads**. Loads can be externally slung on most utility and cargo helicopters by attaching external loads to a cargo hook(s) mounted on the bottom of the helicopter. Slung loads have advantages and disadvantages over internal loads as follows:

a. **Advantages**.

(1) pick-up time and drop off time for slung loads is much faster than for internal loads; and

(2) more prepared loads can be moved in a given period of time; and

b. **Disadvantages**.

(1) load preparation is time consuming;

(2) additional manpower and slinging equipment is needed to prepare loads;

(3) enroute airspeeds are decreased; and

(4) unloading and loading of vehicles may be required at both the pick-up and drop off points.

7. **Slinging of Guns**. Helicopters can re-position field artillery. A gun, its basic ammo load and crew, can all be slung in a single load, depending on the size of the helicopter. The slinging of guns can either be an administrative move, in the low threat rear area, or a tactical move in the forward, higher threat area. Some tactical gun moves, such as fire support for airmobile operations, are of short duration, where the guns are inserted for limited fire mission support and then extracted. For slinging operations, the supported unit must rig the loads and provide a marshaller and a hook-up person. Details on marshalling and slinging procedures can be found in B-GA-442-001/FP-001 *Tactical Aviation TT&Ps*.

8. **CH 146 Slinging of Guns**. Due to weight limitations, the tactical slinging of guns is not feasible with the CH 146. When the requirements for both the Griffon and the LG1 were published, it was determined that helicopter mobility of the LG1 was not a priority, and this was not pursued in the specifications of either the gun, or the helicopter. The Griffon is able to support gun sling training for administrative and training purposes only. It is conducted to assist Gunners in maintaining currency with the skills necessary to allow artillery airmobile operations in a coalition context. The slinging of guns is not an activity conducted by the CH 146 in an operational theatre. The movement of Canadian guns in a coalition scenario will be accomplished through the use of other coalition helicopters.

PLANNING CONSIDERATIONS

9. Combat airlift operations require detailed planning. For the transport of a large number of troops, planning should be accomplished as if it were an airmobile operation (Chapter 7). Mission planning for general support missions, passenger transport and logistics resupply missions require detailed planning also. These missions can present a high level of risk, depending on the area of operations. Often these missions are accomplished by one or two sections of helicopters and the distances involved may be great. Listed below are planning considerations for aircrew conducting tactical transport missions:

a. **Distance**. Helicopters may be required to operate a long distance from their squadron's location. Consideration must be given as to where they will be refuelled and where maintenance support will be, if needed. Coordination with adjacent aviation units can be accomplished so helicopters can refuel at another unit's FARP. This allows the helicopter(s) to continue their mission and increase their time on station;

b. **Airspace**. Aircrew conducting transport missions must understand the airspace structure that is currently active. The structure is published in the Airspace Control Order (ACO). The squadron operations and flight CPs must know what airspace structure the helicopter will utilize to ensure safety of the proposed flight route;

c. **Intelligence**. Helicopters tasked for transport missions normally operate across a large area of the battlespace and may straddle formation boundaries. The Sqn IO must recognize this and utilize all available assets in order to provide the aircrew with a detailed enemy situation. The IO must evaluate potential threats that may affect the aircrew and recommend changes to their mission, and to avoid potential threats;

d. **Fire Support**. For large scale troop movements, fire support should be planned. Working with the supported formation's FSCC, targets can be developed to support the tactical transport plan. For small tactical transport operations, fire support is probably not planned. However, aircrew should understand how to contact fire support assets if necessary; and

e. **Communications**. The parent unit maintains certain command and control functions (i.e. maintenance, flight safety). Since these helicopters often operate out of radio range from their main CP, alternate arrangements must be made to keep the utility squadron aware of mission status. Aircrew may conduct periodic situation reports when in radio communications range, or arrange to provide SITREPs via the supported unit's net.

CHAPTER 7

AIRMOBILE OPERATIONS

GENERAL

1. Airmobile operations are classified by 1 CAD under "Combat Airlift" and are grouped by the Land Forces under "Unique Operations". For this reason and the fact this mission is covered in great detail, it has been allocated its own chapter. Tactical aviation and infantry units can be fully integrated with other members of the combined arms team to form an airmobile force that encompasses both flexibility and responsiveness. It allows a land force commander to mass combat power at the decisive time on the battlefield so it has a devastating effect on the enemy. It requires detailed planning and precise synchronization of all elements of the combined arms team.

Figure 7-1. Off Loading Airmobile Troops

DEFINITIONS

2. **Airmobile Operation**. An operation in which combat forces and their equipment manoeuvre about the battlefield in aircraft, normally helicopters, to engage in ground combat (ADTB). The number of helicopters involved in the operation does not define the airmobile. All airmobile operations, regardless of the number of assets involved, must be planned and executed as combined arms operations. The time required for planning may vary depending on the estimate process, but the planning considerations should be the same.

3. **Close Operations**.

   a. An airmobile operation may be conducted at any time during close operations. The land force commander may request helicopter assets when speed and mobility is needed to mass forces where they are most needed. Rapid movement of forces during close operations allows friendly forces to maintain momentum and forces the enemy to fight in a changing situation. An airmobile operation planned in support of close operations must be able to be executed rapidly; and

b. Airmobile operations during close operations include:

(1) the reinforcement of committed or encircled forces,

(2) the seizure of key terrain/ key locations (i.e., bridges, road intersections),

(3) the over flight of obstacles or barriers,

(4) the setting up of blocking positions,

(5) the conduct of tactical security missions (such as screens),

(6) the positioning of forces to prevent a penetration, and

(7) the support to economy of force missions.

4. Deep Operations.

a. Planning deep operations creates unique challenges for the Airmobile Force Commander (AFC). In deep operations, the force most often lands behind the enemy FLOT. In these operations, the Aviation Mission Commander (AMC) must be prepared to provide support to the land force even after the final insertion is complete. Re-supply, CASEVAC and extraction operations during deep operations is likely accomplished by air. The AFC and the AMC must plan carefully for these operations to prevent the land force commander from becoming cut off from friendly forces; and

b. Airmobile deep operations include:

(1) raids to destroy high payoff targets (ammunition storage areas, C2 nodes),

(2) cutting off retreating enemy forces (pursuits),

(3) setting up blocking positions to shape the battlefield,

(4) seizing and holding key terrain, and

(5) the insertion or extraction of long range patrols.

5. Rear Area Operations.

a. Rear area operations offer a challenge to the land force and aviation commanders because the location of the operation is determined by the enemy. The land force commander must, during the planning process, identify the most likely infiltration routes and targets that enemy forces, airborne and special operations units may attack. In order to identify potential PZs and LZs, flight routes and fire support targets. The land force commander then develops a plan to monitor these targets for any indications of an attack;

b. rear area operations are coordinated with designated military police, CIMIC and host nation authorities if required; and

c. the force conducting rear area operations may be given missions that include the destruction of enemy forces in the rear area, secure key locations (i.e. ammunition supply points, C2 nodes) and hold the enemy until a larger force can move in to destroy the enemy force.

CAPABILITIES AND LIMITATIONS

6. **Capabilities**. An airmobile force provides commanders with many capabilities. An airmobile can transport and rapidly concentrate large numbers of combat troops and take the battle to the enemy. The airmobile force can:

a. attack from any direction, engage objectives in otherwise inaccessible areas, overfly barriers, bypass enemy positions, achieve tactical surprise, and cause the enemy to react prematurely or expose themselves to other attacking forces;

b. concentrate, disperse, or redeploy rapidly to extend its area of influence, to develop enemy contact, or to decrease its vulnerability to enemy attack;

c. provide flexibility to the land force commander by allowing reliance on a small, highly mobile reserve, while committing a larger portion of the force to action;

d. maintain a rapid tempo of operations;

e. achieve deception and surprise by conducting operations in limited visibility conditions or at night;

f. conduct independent operations (for a limited duration);

g. conduct operations over a wide area including the ability to react to rear area threats; and

h. place combat forces at the decisive point in the battle in the most favourable tactical position.

7. **Limitations**. Many of the limitations that affect an airmobile operation are similar to those that limit aviation operations in general. The limitations that the AMC must consider include:

a. adverse weather (heat, dust, snow, and visibility) can hinder helicopter operations;

b. the requirement for adequate planning and preparation time for complex operations, particularly at night;

c. the availability of suitable landing and pickup zones, including enemy action to deny use of landing zones through obstacles or mining;

d. enemy action through ground forces, EW, air defence during landing, take-off or assembly. Enemy firepower may be sufficient to prevent landing at the most advantageous location and time. Alternate plans must be implemented;

e. the type and quantity of supporting weapons, vehicles and heavy equipment that can be lifted into the objective area, limits the mobility and firepower of the lifted force;

f. the dependence on combat airlift to maintain operations;

g. problems of extraction of forces in contact with the enemy;

h. the enemy NBC capability and availability of NBC equipment; and

i. force protection once on the ground due to the light nature of the force.

MISSION

8. The mission of an airmobile is to move combat forces and their equipment to engage in ground combat. (If ground combat is not involved, then the movement or repositioning of troops is a troop movement mission. See Chapter 6).

KEY PERSONNEL

9. **Airmobile Force Commander (AFC).** This commander is a land force commander who is charged with the overall responsibility and planning for and the execution of the operation, and who normally requires tactical aviation advice.

10. **Aviation Mission Commander (AMC).** The AMC's responsibility is to ensure that the aviation effort is coordinated effectively. The AMC is appointed by the CO or a Flt Comd, is subordinate to the AFC, and acts as the principal air adviser on aviation matters. The AMC's main responsibilities are:

a. controlling aviation elements;

b. establishing timely liaison with the AFC and lifted land force units;

c. assisting with the preparation of plans and orders for the airmobile operations;

d. liaising with field artillery, air defence, airspace control and tactical air control agencies;

e. coordinating the preliminary operations;

f. providing technical information to the AFC; and

g. developing the aviation elements logistic requirements with the AFC.

11. **Aviation Unit Commander (AUC).** An AUC is the commander of a helicopter unit or flight providing support for an airmobile operation.

12. **Lifted Unit Commander (LUC)**. The LUC is the commander of a land force unit within the airmobile force and is subordinate to the AFC. The LUC's primary responsibility is the execution of the unit's part of the ground tactical plan but may also include preparatory and subsequent tasks by the AFC. Support elements, including aviation, may be allocated for certain phases of an operation.

13. **Aviation Liaison Officer (ALO)**. The ALO is the AMC's representative to the AFC and/or LUC. ALOs must be experienced pilots, knowledgeable in all aspects of aviation employment and operations. Depending on the operation, their role is to co-locate with the AFC/LUC and advise on all aviation matters. In the event that several helicopter units are involved in an operation, there is the requirement for an ALO from each unit. The ALO assists the AMC and LUC staff in developing the air movement table, selecting PZs, LZs, primary/alternate flight routes, coordinating airspace, developing a fire support plan, and executing PZ operations. The ALO does not replace the AMC during the planning phase of the airmobile. The AMC interacts with the AFC and LUC directly on all matters. In the absence of the AMC, the ALO acts IAW the AMC's guidance.

a. **ALO Considerations**.

(1) **Deploy Early**. As soon as the aviation unit is given a Wng O to conduct an airmobile, the CO must assign an ALO, brief the ALO and send him/her ASAP to the LUC headquarters,

(2) **AMC's Intent**. The ALO must understand the intent of the AMC for using helicopters to support the airmobile. To do this, the ALO must constantly contact the AMC and keep the AMC updated on the status of the planning and receive guidance from the AMC,

(3) **Keep the AMC Informed**. The ALO must advise the AMC on all changes and adjustments to the airmobile plan made by the AFC, and

(4) **Decision Making**. The ALO should not make decisions for the AMC unless the AMC has delegated that authority. The ALO should take all issues requiring a decision to the AMC, who should coordinate directly with the AFC for resolution;

b. **ALO Duties in the PZ**. Supported usually by the LUC's RSM, the ALO is responsible for the setup of the PZ. They organize, control and coordinate PZ operations. They execute mission changes IAW the AMC orders and helicopter availability. They execute the bump plan if necessary and keep the AFC, AMC and LUC informed of any PZ situation that may require adjustment of the airmobile concept of ops. The ALO ensures the PZ is clear of obstacles, marks the PZ and communicates to the helicopters on either the lifted unit frequency, the aviation unit frequency or a separate PZ frequency, whichever is appropriate; and

c. **ALO Duties in the LZ**. There may be requirements for the ALO to be lifted into the LZ. This occurs only if there is a requirement for a planned extraction after the objective has been secured. The duties are similar to those in the PZ except that the situation for extraction may be more critical and time compressed. The ALO must remain informed of the casualty extraction requirements. If possible, any helicopters that are utilized for resupply should be used for evacuation of wounded on their return flight leg.

14. **Flight Lead**. The flight lead is responsible for assisting the AMC in selecting flight routes (primary and alternate), developing timing for the routes, submitting route card data for the production of route navigation cards, navigating the flight routes and ensuring that the times are met IAW the air movement table.

15. **Airmobile Planning Team**. The staff of the squadron conducting the airmobile has a significant responsibility during the planning and execution of the operation. Aside from the positions already identified, the airmobile planning includes, the Deputy AMC (D/AMC), Sqn Ops O and the Sqn IO, along with the Sqn Log Sp Flt Comd. Although not being in a direct planning role as the actual AMC, the sqn staff interact continuously with the AMC to ensure that the aviation assets are utilized to their maximum capabilities. The D/AMC acts as the 2 i/c for the AMC during the planning and the operation. During the planning stage the Sqn Ops O and IO should locate with the AMC. The D/AMC and the Sqn Ops O assist the AMC and ALO in the development of the aviation concept of ops, prepare the aviation plans and orders for the CO, coordinate airspace and assists in developing a fire support plan to support the aviation mission. The IO must develop the enemy threat to the helicopters. From the analysis, the IO coordinates with the AMC to develop a fire support plan to support the inbound helicopters. The sqn staff produces an Op O for the aviation elements participating in the airmobile.

17. **Airmobile Security Element**. This element may be made up of either attack or armed helicopters along with reconnaissance helicopters. This helicopter unit's primary mission during an airmobile is to protect the airmobile force both enroute and once on the objective. The helicopter commander manoeuvres the assets IAW the AFC's plan, under the control of the AMC. If attack helicopters are available, they can provide suppressive fire around the PZ and the LZ, attack enemy positions encountered en route, or attack enemy forces.

COMMAND AND CONTROL

18. The AFC must address command and control requirements early in the planning phase of an airmobile. An effective C2 system must be established that allows control of diverse and widely dispersed air and land force elements between the PZ and the LZ. Command and control of an airmobile operation must be planned in detail. It must address the location of key commanders, the location and composition of C2 nodes and the radio nets utilized during the operation. The key to successful airmobile C2 lies in precise, centralized planning and decentralized execution.

a. **Command**. The AMC is a crew member on the mission, but should not act as an aircraft captain. The D/AMC should be located in a separate section, and

b. **Radio Nets**. A mix of air to air, air to ground, and ground to ground radio nets are established to provide the necessary command and control for the airmobile operation. The radio nets established make C2 easier and contribute to the success of the operation. Radio nets for the mission are:

(1) **Supported Unit Command Net**. This net is an FM net that is used for unit to unit communications during an airmobile. It is used by the AFC to communicate with subordinate unit commanders. It is also used for the land force commander to communicate with the AMC,

(2) **Aviation Unit Net**. These nets can be either VHF/AM or UHF/AM nets and are utilized for internal flight communications. Use of a net provides the flight or element commanders with a dedicated frequency with which to direct and control individual helicopters, or sections. All aviation elements should monitor this net. It is used to pass situation reports and mission changes between the land force and the airmobile helicopters. The ALO uses this frequency to communicate with the lift helicopter, providing information on PZ security status, PZ hazards and changes to PZ operations,

(3) **Tactical Air Net**. This net is normally a UHF frequency for air to air communications. All aviation elements (lift, recce and attack helicopters, and CAS aircraft) monitor this net. The purpose of this net is for the AMC to communicate with the commanders of the air/aviation assets involved in the mission, and

(4) **Fire Support Net**. This is an FM net operated by the land force FOO or AOP. All aviation elements must have access to this frequency in order to call for fire support. The Fire Support Net becomes a very busy net during an airmobile operation. All of the aviation elements do not need to monitor this net, only those responsible for the direction and control of fire. However, all aircrew must have the frequency and call signs in case they pick up responsibility for directing fire due to helicopter losses.

19. How and who monitors the nets is at the discretion of the AMC. With the capabilities of the CH 146, the SCAN feature can be used to increase the number of frequencies monitored. Close coordination must be done to ensure that the KY58 and HVQK features are used to ensure mission security.

PLANS

20. The five basic plans that comprise an airmobile operation are the ground tactical plan, the landing plan, the air movement plan, the loading plan and the staging plan. Airmobiles are planned in reverse order of execution, beginning with the ground tactical plan and working backward to the staging plan. Reverse planning is imperative as each successive planning step has an impact on the step that precedes it to ensure that all aspects ultimately support the AFC's ground manoeuvre plan. The five plans are detailed as follows:

a. **Ground Tactical Plan**. The ground tactical plan specifies actions in the objective area that lead to accomplishment of the mission. The ground tactical plan addresses the following areas:

(1) **Organization for Combat**. The mission, enemy situation, terrain, manoeuvre forces and fire support assets all help airmobile planners determine the organization of the force. Emphasis is placed on:

(a) utilizing firepower in the initial assault. This is especially important if the AFC plans to land near the objective,

(b) ensuring that the force inserted is large enough to quickly achieve the initial objectives. Aviation forces must be massed in the LZ and build up a significant combat capability early to prevent being defeated by repositioning enemy forces, and

(c) ensuring the AFC properly allocates their CS and CSS assets to sustain the task force until follow on forces arrive,

(2) **Fire Support**. The AFC must consider relocating field artillery if the LZ is out of range. Helicopters may be required to sling field artillery and ammunition. The amount of field artillery available to support the airmobile and their location are critical factors in determining the ground tactical plan and the subsequent plans of the airmobile,

(3) **Concept of Operations**. The AFC develops a concept of operations to accomplish the mission. Development of the concept of operations must be done prior to development of the airmobile. Concept of operations development by the AFC allows subsequent planning phases of the airmobile to be accomplished. Development of the ground tactical plan need not be complete to begin mission planning. The land force concept of operations must be known in general. The aviation planners should not wait for the completed land force Op O to begin planning,

(4) As soon as the general concept of operations is approved by the AFC, the aviation staff and can begin the airmobile planning process, and

(5) **Commander's Intent**. The AFC must articulate early the intent for the airmobile. The commander's intent for the airmobile allows the planners to clearly understand the rationale and end state and begin to plan the subsequent plans. The commander's intent for the airmobile includes whether the force lands on the objective or near it and then manoeuvres to it. The commander's intent for the airmobile may include surprise as a critical element, which leads to the development of the fire support and SEAD plans. Intent varies based on the factors of the estimate, but it is critical that the AMC receive the commander's intent as soon as possible after the mission is received,

b. **Landing Plan**. The concept of operations and the ground tactical plan directly impact on the selection of landing zones, the landing formation, the number of troops, and the amount of firepower that must be lifted into the LZ. The landing plan must be done in accordance with the development of the ground tactical plan. The landing plan must support the land force commander's intent and concept of operations. The landing plan outlines the distribution, timing and sequencing of helicopters into the LZ.

(1) **LZ Selection**. In coordination with the AMC and the ALO, the AFC/LUC selects primary and alternate LZs. The number of selected LZs is based upon the land force concept of operations and LZ availability. The aviation planners advise the AFC on LZ suitability. The considerations for selecting suitable landing zones are:

(a) **Location**. The LZ must be located in an area that supports the ground tactical plan of the AFC. It may be located on the objective, close by or at a distance,

(b) **Capacity**. The selected LZ must be big enough to support the maximum number of helicopters that will be utilized in any one lift,

(c) **Enemy Disposition and Capabilities**. The AMC must consider Air Defense Artillery locations and weapons ranges and the ability of the enemy to reposition ground forces to react to the airmobile,

(d) **Unit Tactical Integrity**. Sections must land intact in the LZ, and platoons must land in the same serial. This ensures fighting unit integrity during the operation,

(e) **Supporting Fire**. LZs must be selected that are in the range of fire support (artillery, CAS, naval gunfire),

(f) **Obstacles**. LZ selection must include avoiding obstacles in the LZ,

(g) **Identification from the Air**. The LZ should be identifiable from the air, and

(h) **Landing Formations**. What formation the helicopters land in is dependent on a number of factors including size, shape, wind, helicopter numbers, approach/departure routes and ease of control. The proximity to the objective/enemy also influences the formation,

(2) **The Decision to Use A Single LZ or Multiple LZs** is based upon the ground tactical plan and the AFC's intent. However, there are advantages to using single or multiple LZs. The advantages of single LZs are:

(a) the control of operations is easier,

(b) it requires less planning and rehearsal time,

(c) it centralizes any required resupply operations,

(d) it concentrates supporting fires on one location,

(e) it provides improved security to follow-on lifts,

(f) it masses more combat power in a single location, and

(g) it may make the detection of the airmobile force by enemy units more difficult because the operation is confined to a smaller area of the battlefield, and

(3) **The Advantages of Multiple LZs**:

(a) the force is not grouped in one location,

(b) it forces the enemy to fight in multiple directions,

(c) it reduces the opportunity for the enemy to site weapons on one position,

(d) it allows for the rapid dispersal of ground elements to accomplish tasks in separate areas, and

(e) it makes the size of the airmobile force difficult for the enemy to determine;

c. **Air Movement Plan**. The air movement plan is based on the ground tactical and landing plan. It specifies the schedule and provides the instructions for the movement of troops, equipment, and supplies from the PZ to the LZ. It provides coordinating instructions regarding air routes, air control points (ACPs), airspeeds, altitudes, formations and fire support. The AFC develops the air movement plan in conjunction with the AMC who in turn utilizes the LUC, D/AMC, ALO, and flight lead(s). The air movement plan results in the production of the air movement table and the mission card.

(1) **Flight Route Selection**. Depending on the operational area, a fixed set of air routes will be in place from which the planning team must select the best one. If none are usable, an airspace request must be submitted to the appropriate HQ,

(2) **Selection of Flight Routes**, whether they are pre-existing or mission specific, is always based upon the factors that come from the estimate. The AMC and aviation staff must consider the location of friendly troops, enemy disposition, air defense systems, terrain and the locations of the PZ and LZ to select the best flight route. Selected flight routes should always be laid over the enemy situational template to ensure that the route selected best avoids known or suspected enemy positions,

(3) The planning team and the AMC must select primary and alternate flight routes. Alternate flight routes are selected to provide the airmobile force with a pre-planned, pre-coordinated method of moving from the PZ to LZ if the primary route becomes compromised,

(4) Flight routes that pass through adjacent formation sectors must be coordinated and approved by the adjacent formation to avoid potential fratricide. This adds considerable time to the planning cycle as the impact of this route on the adjacent battle may be significant, and

(5) When selecting flight routes, the AMC and planning team must consider the following factors:

(a) **Airspace Management**. Flight routes are designed to provide aviation units with manoeuvre space, free from friendly fire. The routes must be planned so as not to conflict with field artillery or ground manoeuvre forces. They should not overfly friendly field artillery locations. Flight routes must be coordinated with all forces to ensure prevention of fratricide,

(b) **Support of the Landing Plan**. Flight routes should provide for approach to and departure from the LZ so as to minimize the ability of the enemy to determine/target the LZ,

(c) **Enemy Capabilities**. To minimize enemy observation and acquisition, flight routes should make maximum use of terrain, cover and concealment and avoid known or suspected enemy positions,

(d) **Fire Support**. Flight routes should be selected that are within the range of friendly fire support assets, and

(e) **Distance**. To reduce helicopter exposure time and to reduce the ability of the enemy to observe the airmobile, flight routes should be as short as possible while still maintaining cover and protection;

d. **Loading Plan**. The AFC bases the loading plan on the air movement plan and the ground tactical plan. The loading plan ensures that troops, equipment and supplies are loaded on the correct helicopter. It establishes the priority of loads, the bump plan and the cross loading of equipment and personnel. Detailed load planning ensures that the airmobile force arrives at the LZ configured to support the ground tactical plan. Planning for the loading plan must include the organization and operation of the PZ, the loading of helicopters, and the bump plan. A bump plan ensures that essential troops and equipment are loaded ahead of less critical loads in case helicopters are lost during the mission.

(1) **PZ Selection**. The first step in the loading plan is selection of a suitable PZ or PZs. Primary and alternate PZs should be selected during this process. The number of PZs selected is based on the intent of the AFC, the location of the airmobile force in relation to the PZ and the size and capability of available PZs. The AMC, and ALO select suitable pickup zones that support the intent of the AFC. PZ selection should be based on the following considerations:

(a) **Number**. The AFC specifies the number of PZs based on the factors discussed above. Multiple PZs may have an advantage over single PZs because they avoid concentrating the force in one location. However, multiple PZ operations require detailed and precise planning,

(b) **Size**. Each PZ should accommodate all supporting helicopters at one time,

(c) **Proximity to Troops**. PZs should be selected that are close to the lifted unit so they are not required to travel a long distance,

(d) **Accessibility**. PZs should be accessible to vehicles that move support assets and troops. However, they should be located in an area that limits traffic from vehicles or personnel that are not directly involved in PZ operations,

(e) **Vulnerability to Attack**. PZs should be masked by terrain from enemy observation,

(f) **Conditions**. PZ selection needs to take into account the surface conditions of the area. Excessive slope, blowing dust or sand, blowing snow and large rocks all create potential hazards to PZ operations, and

(g) **PZ Formations**. Like the LZ formations, the PZ formation is dependent on size, shape, wind, the number of helicopters, approach/ departure routes and ease of control,

(2) **Aviation Involvement**. The AMC must ensure that aviation expertise is present on the PZ. The ALO or another designated representative, should locate with the lifted unit during the PZ selection, set-up and execution phase,

(3) **PZ Control**. Once the AFC selects the PZ, the ALO and the OIC of the lifted unit organize, control and coordinate the PZ operation. The ALO's responsibility is to take into consideration helicopter factors. For example, the PZ landing direction may change if the wind changes significantly. Additionally, the aviation representative can offer advice on surface conditions and their effect on helicopter operations. Security of the PZ should always be considered and is the sole

responsibility of the AFC through the LUC(s). Some of the ALO's responsibilities in the PZ are:

(a) to establish communications with helicopters,

(b) to control helicopter arrival to PZ,

(c) to advise the LUC(s) of changes due to helicopter problems,

(d) to be responsible for the execution of the Bump Plan,

(e) to control clearing the PZ of obstacles,

(f) to mark the PZ, dependent on the number and types of helicopters to land at any one time and the loads to be lifted, and

(g) to establish CASEVAC and slung load areas,

(4) **PZ Communications**. Communications must be by the most secure means available. PZ operations may be conducted under radio silence to avoid electronic detection. If under radio silence, it is imperative that aircrew remain on schedule to allow the ALO to keep a smooth flow of troops off of the PZ. PZ communications are accomplished on either the established aviation unit net or a dedicated PZ frequency, with transmissions kept to a minimum,

(5) **PZ Marking**. The ALO directs the marking of the PZ. PZ marking must be done so the PZ is identifiable from the air. Far and near recognition signals are needed, especially at night to allow the pilots to orient on the PZ quickly. Touchdown points must be clearly marked utilizing personnel or ground marking, and

(6) **Disposition of Loads on the PZ**. Personnel and equipment must be positioned on the PZ to conform with the landing formation. Aircrew must know the loading plan on the PZ and be prepared to accept troops and equipment immediately on landing. PZ sketches depicting location of loads in the PZ assist aircrew in loading troops and equipment quickly once the helicopters arrive in the PZ. Aircrew should, when possible, be provided a PZ diagram. Figure 7-2 shows an example of a PZ diagram; and

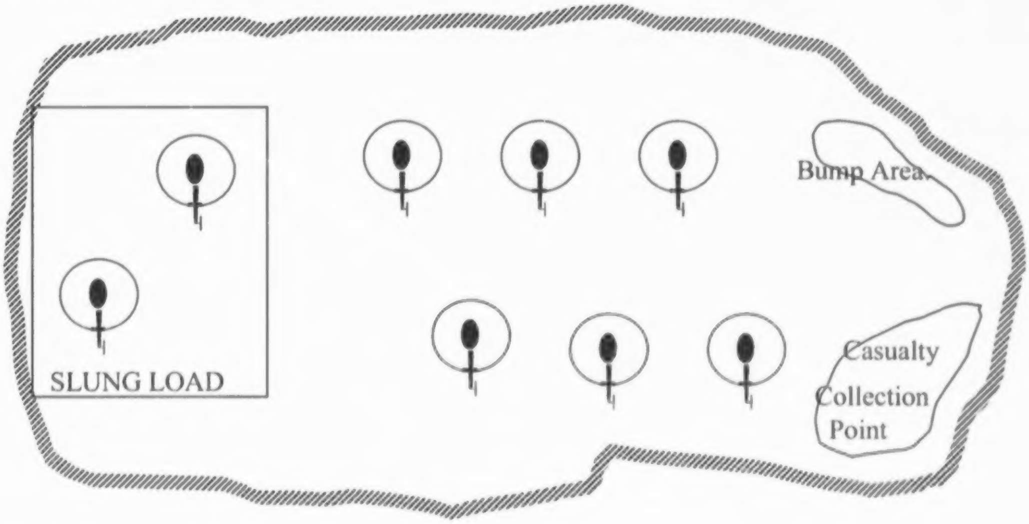

Figure 7-2. PZ Diagram

e. **Staging Plan**. The staging plan is based on the loading plan and prescribes the proper order for movement of personnel and helicopters to the PZ. Loads must be ready before the helicopters arrive at the PZ. During mission planning the ALO determines the time required to set up the PZ and selects times (based upon the airmobile L-hour) that the PZ control group establishes the PZ. During the staging plan the aviation unit is conducting mission planning, orders, rehearsals and necessary checks to ensure that the mission times are met once the mission is executed. During the staging plan, the aviation unit should focus on:

(1) **Mission Planning**. Mission planning includes the coordination between the AFC and the AMC, development of the aviation Op O, issuing the Op O, an aircrew briefing, and rehearsals,

(2) **Checks and Inspections**. During the staging plan, the helicopters are prepared for the operation. The SAMEO and element leads ensure that all helicopters have sufficient fuel, the required security communications, serviceable mission kits and equipment and that each helicopter is prepared to accept the loads for the airmobile (internal or external),

(3) **FARP Operations**. If a FARP is to be utilized during the airmobile mission, it must be planned and positioned during the staging plan. Consideration should be given to site selection, time required to be operational, travel time, safety inspection criteria and night set-up considerations (if applicable). (See Chapter 10 details FARP operations), and

(4) **Routes to the PZ**. The AMC must select flight routes to the PZ that allow the helicopters to arrive at the PZ on time, in the proper landing direction.

PLANNING PROCESS

21. The success of any mission depends largely on the planning process. The time available for planning an airmobile operation varies; however, enough time must be allotted for detailed planning and synchronization to occur. For company level operations, an average of 24 hours should be allotted for planning. For battalion level airmobile, up to 48 hours should be allotted for planning. Airmobile operations involving small numbers of helicopters and personnel may not require as much time to be planned successfully. Airmobile operations may be conducted with less time to plan than this but the AFC/LUC must understand that a much greater risk is assumed with a condensed planning time. The battle procedure process for aviation mission planning is detailed in the *Tactical Aviation TT&Ps*.

22. Airmobile planning begins when the aviation unit receives a warning order from higher headquarters. The warning order should specify whom the AFC and lifted unit is. This allows the aviation commander to dispatch an ALO early to the AFC headquarters and prepare the aviation unit for the initial planning stages.

23. **Initial Planning Conference (IPC)**. The initial planning conference is the first meeting between the AFC staff and the aviation unit. The aviation unit should be represented as a minimum by the AMC and ALO plus any additional members of the squadron that the AMC selects to bring. The location of the IPC can be either at the LUC headquarters or at a location selected by the AFC. The IPC should occur early in the planning process. As soon as the AFC has a general idea of the intent and ground tactical plan concept of ops, then the planning can start.

24. At the IPC, the AFC must make clear to the AMC and the LUC, the intent of the operation and the critical information that must be gathered that directly affects their decisions and dictates the successful execution of the operation. For the AMC, the information passed, or directed to be collected, influences the abort criteria and the minimum numbers and types of helicopters required to carry out the operation. Some of the points that should be discussed during the IPC are:

a. what are the locations of air defense systems that can affect the mission and range the PZ, LZ, and routes?;

b. what enemy ground forces have the ability to reposition and influence the LZ?;

c. is the LZ in direct fire range of any enemy forces?;

d. the minimum number of helicopters required., thereafter the commander must be notified if availability drops below the number determined;

e. the timings for various phases of the operation;

f. the weather limits must be established with a go/no go time for the weather call. The commander must be notified if weather is less than established minimums at that time so alternate planning can be conducted; and

g. the preparation, marking, and movement to the PZ by the land force and aviation forces.

25. The result of this initial planning is that the AFC must establish decision points that affect the airmobile. If and when these decision points are reached they require the AFC to do one of three things:

a. abort the mission;

b. change the concept of ops; or

c. accept the risk and continue as planned.

26. **Mission Briefing**. The mission briefing is the final coordination meeting of key airmobile personnel. It is designed for personnel from the land force and aviation units to brief the plan to the AFC. They are not planning sessions. The planning for the airmobile should be complete by this time. Once this briefing is completed, the AFC approves the plan and the formal orders are given soon after. For the aviation unit(s), the minimum attendees should be the AMC, the AUC(s), and the ALO. The AMC should brief the aviation portion of the operation.

27. **Aviation Orders Development**. Once the plan has been approved by the AFC and orders are given, the LUC and AMC complete their planning/orders.

a. **Aviation Orders**. The AMC, along with his planning team, prepare the aviation orders for the aviation portion of the airmobile. These orders may be in the form of verbal, written or overlay orders. The order is approved by the AMC and is planned in parallel with the airmobile mission planning process by the LUC. The orders cover the aviation mission and shall include as a minimum each element lead of the aviation portion of the mission to include any transport, reconnaissance, and attack helicopter assets. The orders are briefed to the AUCs along with any fire support or CAS personnel involved in the airmobile. Maximum time must be provided to subordinate aviation commanders so those aircrew executing the mission have sufficient mission preparation time; and

b. **Aircrew Briefing**. The aircrew briefing covers the aircrew actions and planning necessary to successfully accomplish the mission. Aircrew briefings are normally given by the AMC. This briefing is an important portion of the unit's support to the airmobile.

28. **Rehearsals**. Rehearsals assist units in clarifying the concept of operations, synchronizing the actions of each sub-element, orienting subordinates to the positions and actions of other units and practicing any possible branches and sequels from the decision support matrix. The aviation rehearsal focuses on synchronizing the aviation assets involved. The squadron should conduct a rehearsal to synchronize its elements of the airmobile. It

should have a representative from the lifted unit and a representative from the fire support element. The type of rehearsal conducted is dependent upon time available and specific operation taking the form of either a map or terrain model rehearsal. It must be focused on synchronizing the assets involved and coming up with contingencies for the most likely events that can affect the plan.

SECURITY

29. Airmobile security forces provide force protection for the airmobile. It encompasses the entire range of planning and operations conducted to protect the land force as it moves from the PZ to the LZ. It is planned and executed as an integral part of the airmobile operation and is planned by the AFC. It is a highly synchronized operation often involving many different types of units executing reconnaissance, tactical security, electronic warfare and other missions in support of the airmobile force. Generally, once a route is secured, it remains secured. Units involved in airmobile security are as follows:

a. **Reconnaissance**. Missions for recce helicopters include screening, route reconnaissance of air axes and flight routes, PZs and LZs, direction and control of fire and the coordination of the passage of lines. During the IPB process, it is determined how these units are actually employed. If attack helicopters are not available for direct fire support, reconnaissance helicopters will be required to perform force protection by means of AOP and FAC,

b. **Land Force Units**. Land force units may also be employed in the airmobile security role. Missions for these units include PZ security, reconnaissance of routes, security of FARPs and passage of line coordination,

c. **Attack Helicopters**. Attack helicopter squadrons are capable of performing the protection missions alone or in concert with reconnaissance helicopters. Attack helicopters can also conduct overwatch and screening of the airmobile force during movement along the flight route from the PZ to LZ, providing protection from enemy ground fire or attacks. They can provide suppressive fire, SEAD and may be used as a reserve force to counterattack threats to the land forces. Attack helicopters may also be integrated in the concept of operations for the ground tactical phase where they may be used to conduct screen, guard or hasty attacks, and

d. **Specialist Units**. Specialist units or forces in the form of pathfinders, Long Range Surveillance Units or UAVs can be utilized to provide intelligence along the route of flight or at the LZ. Some of this information must be requested from higher formations and are usually not readily available for brigade level operations.

TIMINGS

30. The hours designation, **"H, L, Y"** is dependent on numerous factors. The land forces usually utilize the term "H" hour for all their operations. This may be an impractical timing for the AMC to plan from, for the following reasons:

a. the time lapse between the arrival of troops and the helicopters in the LZ may be of sufficient length that the timings are irrelevant to the AMC. This may occur if the troops are being airlifted to await link-up with another force, time to lift in the force spans many hours in which the ground troops may have to re-organize and prepare for crossing the line of departure (LD);

b. coordination for fire support and tactical air support may be critical in which case the "L" or "Y' hour designation may be more fitting for aviation planning considerations;

c. the "L" hour timing for the air movement is fixed, but the "H" hour is on call; and

d. to ensure that there is no confusion between which "H" hour, the use of "L" or "Y" hour distinguishes the ground timings from the air timings.

CHAPTER 8

LOGISTIC AIRLIFT

GENERAL

1. **Transport Helicopters**. Utility Tactical Transport Helicopters (UTTHs) and Medium Transport Helicopters (MTHs) are both transport helicopters capable of conducting the logistic airlift of troops and supplies. Operationally, they differ both in where they operate on the battlefield, and their load capacity or airlift capability. For instance, a CH 146 Griffon operates mainly from the FEBA back to the Division rear area and can carry an allowable cargo load of 2,000 lbs, while a CH 47D Chinook operates mainly between the Division and Corps rear areas and can carry up to 20,000 pounds. Combat airlift (Chapter 6) normally involves UTTHs, each transporting small numbers of combat troops and supplies within the brigade area. Logistic airlift operations normally involve the use of MTHs in the aerial transport of very heavy loads of defensive stores, commodities and combat supplies in the corps and division areas and occasionally to the BSA. This chapter focuses on the use of MTHs as the main logistic transport helicopter.

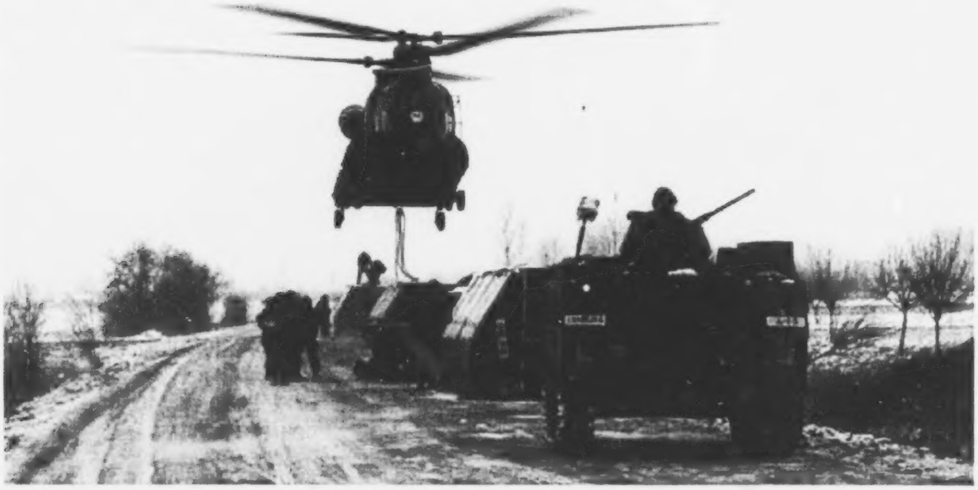

Figure 8-1. CH 47D Chinook Lifting Engineering Equipment

2. **US Army MTH Squadron Organization**. US Army Aviation MTH sqns consist of three or four flights of sixteen CH 47 D Chinooks each. Each flight consists of two sections of eight CH 47Ds. At the corps level, each squadron has four flights (64 Chinooks total) and at the division level there are three flights (48 total).

3. **Logistics**. Logistics entails the essential capabilities, functions, activities and tasks necessary to sustain all elements of the forces operating at all levels of war. Aviation assists the land forces by the aerial delivery of combat supplies. Aviation forces may support major manoeuvre forces, CS elements, or major CSS elements for the manoeuvre force. MTHs may also support aviation specific sustainment requirements. Because of their size and vulnerability to AAA, MTHs generally work between the COSCOM and DISGP, but they can also move forward to the BSA in urgent situations.

CAPABILITIES AND LIMITATIONS OF MTHs

4. **Capabilities**. By conducting logistic airlift operations, Medium Transport Helicopters can significantly influence the land force commander's concept of ops by:

a. conducting day, night, and limited visibility combat, CS, and CSS operations;

b. influencing the tempo of friendly operations;

c. moving large amounts of supplies and equipment to sustain combat operations; and

d. quickly moving critical IOR repair parts forward.

5. **Mission Planning Factors**. Medium Transport Helicopters are subject to many factors that the AMC must consider when mission planning. These factors include:

a. extreme environmental effects (such as high ambient temperatures and high density altitudes) which may reduce the capabilities of the helicopter to perform the full range of missions;

b. adequate time to plan and coordinate with the supported unit(s);

c. the MTH unit may be subject to inadequate CS/CSS because of its extended range of operations and limited organic logistics support;

d. terrain may limit the availability of adequate PZs and LZs;

e. MTHs require large amounts of fuel and repair parts;

f. some units can provide only a limited number of helicopters to support a large combat force;

g. obscurants (such as smoke, dust, fog and snow) can have a detrimental effect on operations;

h. aircrew operational flying time restrictions could affect continuous operations;

i. MTHs have a large, unsuppressed IR signature that makes them vulnerable to IR missiles; and

j. MTHs require extensive maintenance support for extended operations.

MISSION PLANNING CONSIDERATIONS

6. Often MTH missions are accomplished by a single helicopter, and the distances involved, particularly for corps aviation helicopters, may be great. Corps MTHs are normally employed beyond the range of communications from their parent organization. Planning considerations to conduct MTH logistic missions are listed below:

a. **Distance**. Consideration must be given to where these helicopters receive fuel and maintenance support, while on a mission. Coordination with adjacent aviation units can be accomplished so helicopters can refuel at other units' FARPs;

b. **Command and Control**. For mission planning, a point of contact with the supported unit must be provided to the aircrew;

c. **Airspace Control**. Aircrew must understand and comply with the airspace structure that is currently active;

d. **Intelligence**. The Sqn IO must use all available assets to provide the aircrew with a detailed enemy situation. The IO must evaluate potential threats that may affect the mission and recommend changes to avoid potential threats; and

e. **Communications**. Helicopters are under the control of the supported unit, normally OPCON; however, the parent unit still maintains C^2 functions for certain areas. Since these helicopters are often operating out of direct radio range from the parent main CP, alternate arrangements must be made to keep the squadron aware of the mission status. Aircrew may provide periodic situation reports when in communications range or arrange to provide SITREPs via other means.

MISSIONS

7. **General**. The land force commander's estimate influences the missions that are assigned to MTH sqns. With the aviation commander's assistance, the land force commander determines how best to employ MTHs. Some of the common missions that an MTH sqn conducts are:

a. **Movement of Supplies**. The aerial movement of large quantities of supplies and equipment on the battlefield is an important mission. With the lift capability of the MTH, air movement of large quantities of supplies not only results in equipment arriving at its destination rapidly, but also frees up ground transportation assets. The CH 47D can lift up to 20,000 pounds of cargo, either internally or externally. (Internal loads normally bulk out before reaching the weight limit). Logistic resupply operations are discussed by class of supply as follows:

(1) **Class I - Subsistence**. Helicopters from the corps MTH Sqn are used to move these supplies from the COSCOM forward to the DSA. Operating under division control, MTHs move them from

the DSA forward to the BSA and, in special instances, as far forward as a battalion area. LZs are established at DSAs and BSAs specifically for these items,

(2) **Class II – General and Technical Stores**. Replenishing stockage levels of these items may become a mission for MTHs in the corps where they are transported forward from the COSCOM to the DSA. Movement forward from the DSA is most likely accomplished by ground transport,

(3) **Class III - Petroleum, Oil and Lubricants - POL**. Fuel can be transported rapidly around the battlefield. The MTH's function in moving POL is normally as part of a FARP operation. MTHs can externally transport the Forward Area Refuelling Equipment (FARE) system and sling up to five 500 (US) gallon fuel bladders. A complete FARE system is capable of providing up to six helicopter refuelling points. Once the FARE system is in place, UTTHs or MTHs can resupply the FARP by externally moving fuel bladders, and

(4) **Class IX - Repair Parts and Components**. MTHs can move large or heavy IOR repair parts. Corps level MTHs can move repair parts forward from the COSCOM to the DSA. Helicopters operating under division control can expect to move repair parts forward from the DSA to the BSAs; and

b. **Resupply of Airmobile Forces**. Airmobile forces normally go into an LZ with only the minimum essential supplies. MTHs must be prepared to follow up an airmobile by resupplying the airmobile forces. Helicopters must be prepared to conduct rapid refuelling operations and return to a designated PZ to load with air lifted supplies and await for the designated launch time;

c. **Movement of Personnel**. MTH sqns provide the land force commander with a robust airmobile capability for moving large numbers of combat troops great distances. This enables the land force commander to rapidly concentrate combat power at the decisive time and place on the battlefield. Each CH 47D can carry up to 32 combat equipped troops;

d. **MEDEVAC and CASEVAC**. The MTH can also be used to transport patients or casualties and can be rigged to hold 24 stretchers;

e. **Gun Moves**. An MTH can readily move field artillery and their basic ammunition load quickly from one firing position to another; and

f. **Recovery of Downed Aircraft and Critical Equipment**. Damaged aircraft, whether fixed or rotary wing and critical equipment can be slung back for repair.

AIR MOVEMENT RESPONSIBILITIES

8. **Sending Land Force Unit**. The unit that is preparing the loads (internal or external) to be air moved is responsible for all facets of PZ operations. The responsibilities of the sending unit include preparation of the PZ (marking, clearing, communications), rigging of external loads, prioritizing loads, and tracking loads (where the load is going and what the load consists of). The sending unit also provides the aircrew with the correct destination for the loads (LZ location, frequency, call sign, marking, and POC).

9. **Aviation Unit**. The aviation unit that moves the loads is responsible for ensuring that the load is safe to fly and for moving it to the correct location. The moving unit also notifies the receiving unit if any changes are made to the established plan.

10. **Receiving Land Force Unit**. The receiving land force unit is responsible for all facets of LZ operations which include preparation of the LZ (clearing, marking, signalling, communications), de-rigging the loads and loading the used rigging material back onto the helicopter for return to the sending ground unit, if required.

CH 47D CHINOOK CHARACTERISTICS

1. The Chinook helicopter is the main logistic airlift or cargo helicopter used by many nations to support their armies. These include Australia, the UK, the USA, the Netherlands, Spain, and Italy. Since it is such a widely used helicopter, there is a good possibility that it will be in theatre with Canadian Forces as part of a coalition force. The Chinook proved its combat capability during the Falklands War, and the Gulf War. This annex details the characteristics, capabilities, and limitations of the CH 47D:

a. **Characteristics**.

   (1) the CH 47D is a twin engine, tandem rotor helicopter designed for transportation of cargo, troops, slung artillery and weapons during day, night, visual, and instrument conditions;

   (2) the helicopter fuselage is approximately 50 feet long. With a 60 foot rotor span, on each rotor system, the effective length of a CH 47D (with blades turning) is approximately 100 feet from the most forward point of the forward rotor to the most rearward point on the aft rotor;

   (3) the maximum gross weight is 50,000 pounds;

   (4) the maximum airspeed is 170 knots with a normal cruise speed of 130 knots. However, the airspeed for any given mission will vary greatly depending on load configuration (internal or slung), time of day, weather conditions, etc.;

   (5) the minimum crew for tactical operations is four, two pilots, one flight engineer, and one crew chief. For more complex missions, such as NVG operations and airmobiles, commanders may consider using five crew members and add one additional crew chief;

   (6) it can be operated in light or moderate turbulence; and

   (7) it can be operated in IMC;

b. **Capabilities**.

   (1) **The cargo hooks** (slung loads). The helicopter has three cargo hooks for slinging loads, the forward hook, the aft hook and the centre hook. The limits presented below are structural limitations only:

      (a) the structural limit of the forward and aft hook is 17,000 pounds;

(b) the maximum single load that can be suspended as a tandem load from the forward and aft hooks is 25,000 pounds; and

(c) the centre cargo hook is limited to a maximum load of 26,000 pounds;

(2) **Load configuration**. Consideration must be given to the advantages and disadvantages of any particular external load configuration. For example, while it is generally true that a tandem load will ride better and permit a higher airspeed, it is also true that a tandem load usually requires ground personnel to attach the load to the helicopter's cargo hooks. All appropriate references must be researched to insure compliance with any directives regarding load configuration, that is, many loads allow centre hook or tandem hook attachment; and

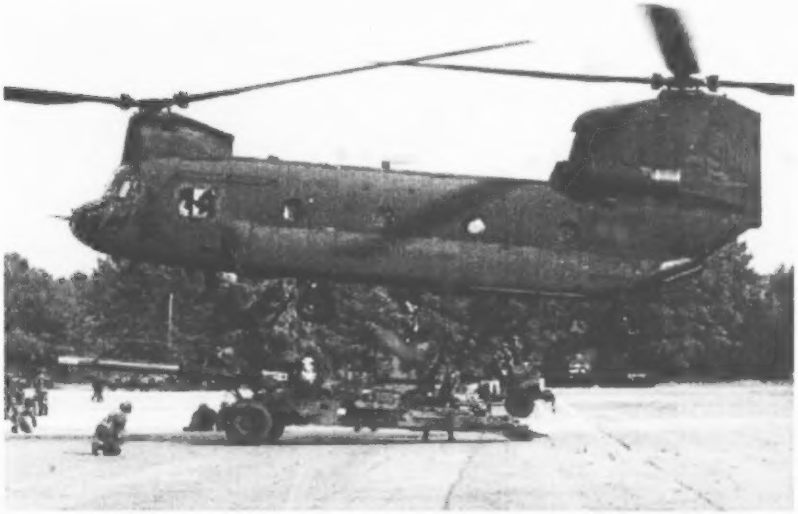

Figure 8A-1. CH 47D Lifting a 155 mm M198

(3) **Internal load.**

(a) **Seating**. Troop seating arrangement for up to 32 fully equipped combat troops is provided. This is broken down by 10 three-man seats and 3 one-man seats. This total number varies greatly due to the configuration of the aircraft's interior. This factor requires extensive consideration before committing a specific number of helicopters with a specific combat load to a given mission. Additionally, the troop commander's jump seat may be available, but is unwieldy and time consuming to use. Troops are normally loaded and unloaded through the lowered aft cargo door and ramp;

(b) **Stretchers**. The stretcher arrangement provides for up to 24 stretchers. These 24 stretchers are configured in six tiers of four stretchers each. In this 24 stretcher configuration, it may be possible to leave the three, one-man seats in position. It is not necessary to remove the fold up troop seats to install the stretchers;

(c) **Cargo Loading** (internal). The dimensions of the cargo compartment are 366 inches long, 90 inches wide, and 78 inches high. These dimensions are uniform throughout the cargo compartment; however, there are some restrictions when fitting items through the two doors;

(d) **Helicopter Internal Cargo Handling System (HICHS)**. CH 47D units have the necessary equipment for four helicopters to be equipped with HICHS. This system provides for quick loading, securing, and unloading of palletized cargo. The system generally uses either the 463L pallet (up to 3 simultaneously) or warehouse wooden pallets (up to 10, depending on size). While cargo can be carried without the use of the HICHS, this system expedites the loading and unloading process; and

(e) **Winch/Hoist System**. The CH 47D is equipped with a 3,000 pound capacity, hydraulically operated winch that can be employed in either of two modes. For the purpose of loading and unloading cargo internally, this system is used in the CARGO mode. This mode permits the winching of cargo up to 3,000 pounds on a straight-line pull, or up to 12,000 pounds, with the aid of pulley blocks. The remaining mode, described as the RESCUE mode, permits the use of this system as a rescue hoist (up to 600 pounds) and is not used for cargo loading; and

c. **Limitations**.

(1) the CH 47D endurance is 2.5 hours and 4.0 hours with one aux fuel tank installed;

(2) the combat radius is approximately 225 kilometres;

(3) the combat radius with one aux fuel tank installed, is approximately 350 kilometres;

(4) the helicopter shall not be started or shutdown in winds (including gusts) in excess of 30 knots; and

(5) continuous flight in light icing conditions below 5 degrees Celsius is not recommended since blade damage can occur from asymmetric ice shedding.

CHAPTER 9

LOGISTICS AND AIRCRAFT MAINTENANCE

GENERAL

1. The aim of the Logistic Support Flight and the Maintenance Flight, the squadron's Combat Service Support (CSS) organization, is to provide the materiel, supplies and technician skills to enable each squadron to accomplish its missions.

CSS CONCEPT

2. Supporting any operation requires the proper quantity and quality of resources in order to provide the necessary elements for a successful mission. The planning considerations for each mission will determine the level of support that is required and will be confirmed during the recce. General and technical support to deployed operations, will be a standard 14 days of supply (DOS) or IAW DCDS directives and 2nd line support organization directives to the deployment.

3. It is essential that only the resources required be sent on a mission. Over-resourcing an operation will have an impact on the ability of the Wing to provide for other missions with the limited numbers of resources. Whether it is personnel, tools or other critical items, once committed, it is very difficult to remove them from a theatre of operations (TOO). An exit strategy (coordinated IAW DCDS requirements) for resources must be put into place during the planning process for all missions to establish when they can be repatriated. Occasionally, this may happen during an ongoing operation.

PERSONNEL

4. The Operational Readiness State (ORS) Model is a document that establishes the number of personnel (rank, MOC and qualifications) and vehicles to support a specified mission (number of aircraft, etc). The ORS is described in 3, 8 and 16 pack aircraft configurations that can either be static or mobile. The number of personnel is established for the basic capabilities and support tasks, any additional functions (FARP, DEWS, etc) would require an additional module of personnel and equipment to the TO&E.

MAINTENANCE AND LOGISTICS

5. The support concept is composed of several elements that can be adjusted depending on the requirements. This can be sub-divided into general functions of maintenance and supply:

   a. T&T Equipment (Tools & Test Equipment);

   b. AMSE (Aircraft Maintenance Support Equipment);

   c. Technical Publications;

   d. Dep ADAM (Deployable Automated Data for Aircraft Maintenance); and

e. COOP (Customer On-Line Ordering Processing).

6. The final composition of the deployment will be based on the mission requirements, adjusted to each specific mission, from relying on weekly re-supply to self-sufficient in aircraft spares for a period of time (up to 60 days).

7. The approach to quantifying the elements of maintenance is a stepped approach, where a minimum baseline is required to support one to three aircraft. Additional aircraft may require adjustment to the baseline whereas aircraft specific equipment (BFK, tow wheels, etc.) will have fixed variable requirements.

8. The supply support will have a linear approach based on the quantity of aircraft deployed and the estimated flying rate.

CONCEPTS OF SUPPORT

9. **Aircraft Fly Away Box**. This is a basic capability where aircrew can function autonomously for up to 72 hours away from Main Operating Base (MOB). The box would contain POL products and minimal tools to carry out basic preventative/servicing functions. An extension of this capability would be the addition of support personnel and equipment (i.e. F & S kits and essential AMSE). This capability would be exercised during a DART deployment, for a period of up to 40 days. There are no provisions for major inspection during this type of deployment.

10. **Contingency Response - Kit (CRK)**. Two "Paul Bunyan type" containers with built in storage that will contain T&T Eqpt (with limited special tools), Pubs and Dep ADAM required to support three aircraft up to 2nd level inspections. To be employed in a static posture, domestic or deployed, where maintenance workshop/facilities exist. The CRK is capable of being moved within unit resources and is equipped to provide all requirements for the first 60 days.

11. **Special Equipment Shelters (SES)**. These are protected working environments and can be located anywhere. A full compliment of SESs configured for the CH 146 is composed of the following: AVN, AVS, Battery, ALSE, Metal, REF, AMCRO, MRP, and COOP. The capabilities of SESs are to provide 2nd level workspace similar to garrison, in a static low threat environment. All the T&T Equipment, Pubs and Dep ADAM can be found in the SESs check lists with specific AMSE as required. The limiting factor is the COOP SES which contains limited spares of consumables only, no repairables, it requires re-supply from 2nd line support element. The COOP SES is better suited for domestic ops.

12. **Special Equipment Vehicles (SEVs)**. These are SESs mounted on a prime mover MLVW. SEVs have been designed and configured to support tactical (High Tempo) mobility operations.

13. **Contingency Response - Aircraft Spares (CRAS)**. BHTC (Bell COOP) controlled, the CRAS is the composed of six "Paul Bunyan" type containers. The CRAS is employed in a static posture where facilities exist to carry out all maintenance functions. The CRAS consists of CH 146 specific spares and consumables scaled to support a three aircraft deployment up to 2nd level inspections for an unlimited duration. A COOP terminal and

IMARSAT are part of the kit. The CRAS is typically static but can be moved within unit resources. It requires re-supply from a 2nd line support element.

14. **Pack Up Aircraft Spares (PUAS)**. PUAC is BHTC (Bell COOP) controlled. The PUAS is composed of one sea container and one MECC shelter employed in a static posture where facilities exist to carry out all maintenance functions. The PUAS is designed and configured to support an eight aircraft deployment in a static location. The sea container is designed for the storage of COOP spares of repairables and consumables. The MECC shelter provides a work environment and holds the COOP terminal and IMARSAT equipment. The PUAS is not mobile and is beyond a unit's capability to move.

PLANNING

15. Logistic and aircraft maintenance planning must be done in conjunction with operational planning.

16. **Fuelling Operations**. Unit helicopters consume large quantities of fuel during each mission. To ensure a continuous unit readiness posture, the unit's logistical planners must accurately plan for, and constantly monitor fuel consumption.

a. **Requesting POL**. The unit initiates requests for POL products. These reports are processed through the supply chain of command, which consolidates user needs and coordinates delivery. Aviation fuel is transported by the brigade service battalion to delivery points for transfer to smaller squadron fuel bowsers; and

b. **Calculating Fuel Requirements**.

(1) fuel requirements are based on both daily and mission needs. Daily needs are calculated by multiplying the estimated daily hours each helicopter will fly, by the consumption rate of that particular helicopter. That total is then multiplied by the total number of helicopters in the unit. The consolidated fuel total of unit helicopters is the daily fuel quantity that must be requisitioned. Mission needs are figured by applying the same formula used to calculate daily needs, except that mission available helicopter totals are used instead of organic totals and mission hours are substituted for daily hours. Considering the fuel that is already in the helicopter tanks when the mission begins, fuel totals derived may be adjusted. This gives the true amount of fuel the FARP requires to support a given mission. The CH146 Griffon has a fuel consumption rate of approximately 400 ltrs per hr. Other NATO helicopter fuel consumption rates can be found in *Tactical Aviation TT&Ps*, and

(2) accurate fuel planning requires continuous coordination between Ops and the Log Sp Flt. The brigade must be integrated into operational planning so sufficient fuel can be requested, and available, for all missions.

VEHICLE AND AIRCRAFT MAINTENANCE AND RECOVERY

17. Each squadron has an integral maintenance flight; however, due to the number of helicopters, ground vehicles, and other critical equipment, additional maintenance assistance from outside the unit is required to sustain operations. Maintenance functions include inspecting, testing, servicing, repairing, requisitioning, rebuilding, recovering, and evacuating equipment. Repair and recovery are accomplished as far forward as possible, and at the lowest capable level. When equipment cannot be repaired on site, it is moved only as far to the rear as necessary for repair. This concept ensures timely repairs and keeps the maximum amount of equipment operational. Helicopter units use the principles of flexible unit structure, direct support, and general support to implement this concept. The key to maintenance management is sound planning and establishing a disciplined maintenance management system to ensure that equipment remains operational.

a. **Vehicle Maintenance**. The squadron performs all integral vehicle and equipment maintenance. Second line maintenance is performed at the GS maintenance facility;

b. **Aircraft Maintenance**. Aircraft maintenance operations continue around the clock. Damaged or inoperable helicopters that require time-consuming repairs are handled in more secure areas toward the rear. Canadian Forces Technical Orders (CFTOs) outline general aircraft maintenance procedures.

(1) aircraft maintenance functions are divided into two categories, scheduled and unscheduled as follows:

(a) **Scheduled Maintenance**. The critical aspect here is the continuous coordination and involvement between unit operations and unit maintenance to accomplish the scheduled maintenance, while also accomplishing the unit's mission. This cooperative effort requires a daily exchange of information to reveal the continuously changing situation that exists in any helicopter unit. Scheduled maintenance includes, predetermined cyclic inspections of helicopter systems and component replacement. These events are scheduled either on a calendar or a flying hour basis, and

(b) **Unscheduled Maintenance**. Unscheduled maintenance is required when a helicopter system, or component, malfunctions or fails unexpectedly. It is also required to correct damage incurred as a result of improper operation or battlefield activity. Because unscheduled maintenance cannot be predicted, units are doctrinally and organizationally prepared to make unscheduled repairs as needed, and

(2) additional maintenance considerations.

(a) **Night Operations**. Land force doctrine demands 24/7 operations. This requires a fully productive, continuously running maintenance capability. Working on helicopters and vehicles day and night dramatically shortens repair time and maximizes the number of mission capable helicopters. This around the clock maintenance capability ensures that helicopters can be utilized on successive days, or nights, by completing the required maintenance during those alternate hours, and

(b) **Other factors**. Aircraft maintenance operations must be carefully planned to permit completion in any environment;

c. **Vehicle and Equipment Recovery**. The goal of this operation is the timely return of vehicles and equipment to operational status with the least expenditure of resources. This required careful coordination of all parties. Recovery operations are normally conducted according to certain general principles. This action begins where, and when, the item becomes disabled. When the operator detects an inoperable condition, the operator must assess the damage or problem, and initiate action based, on his assessment and the tactical situation. Utilizing the 1 Wing WUSOPs, the chain of command is informed, considering all factors, such as communication ability, location, and the location and availability of recovery equipment and personnel; and

d. **Helicopter Recovery**. Combat operations result in a greater demand for operational helicopters and a large increase in the number of flying hours. These increased requirements are complicated by higher attrition, and battle damage rates, which create shortages of repair parts and replacement helicopters. To offset these shortages and to maintain an effective combat aviation force, the rapid recovery and repair of helicopters is essential.

CHAPTER 10

FORWARD ARMING AND REFUELLING POINTS

GENERAL

1. This chapter describes Forward Arming and Refuelling Points (FARPs). It provides a comprehensive view of the purpose, organization, operations and the planning considerations for the setup of a FARP.

DEFINITION

2. A FARP is a temporary arming and refuelling facility organized, equipped, and deployed by an aviation unit to support tactical operations. It is located closer to the FEBA than the normal refuelling area of an aviation unit. It provides fuel and ammunition for aviation units during operations away from their normal assembly area. Due to the fluid situation of all aviation operations, the FARP must be austere, transitory, and able to support specific mission objectives. It should be flexible enough to self-deploy by vehicle or be inserted by air. Although the term FARP suggests rearming, in the Canadian sense it is primarily a refuelling operation but should be able to rearm if the helicopter is equipped with door guns and DEWS munitions.

PURPOSE

3. The FARP reduces transit time and increases the time on station thereby giving the land force commander more time to apply continuous pressure on the enemy or permit helicopters to remain on station longer, rather than waste fuel and time transiting for fuel.

PERSONNEL

4. Personnel generally allocated for the FARP include:

   a. the NCO i/c;

   b. two maintenance personnel per refuelling point;

   c. one driver/pump operator per vehicle or two maintenance personnel as FARE pump operators if bladders are utilized; and

   d. the following personnel may also be required:

      (1) a weapon systems technicians for ammunition and flare handling and reloading,

      (2) in a rapid tempo of operations and/or in high density traffic, air traffic control personnel and communications may be require to coordinate helicopter arrival and departure from the FARP location and, if collocated, into an HA, and

(3) a security section consisting of infantry or integral squadron personnel, situation dependent.

PLANNING FACTORS

5. Three basic principles must be satisfied when planning a FARP to support aviation units. The FARP must:

a. meet unit mission requirements;

b. provide support throughout the mission under all conditions; and

c. avoid threat observation and engagement.

6. The intensity of the operation affects FARP activities. Factors that influence the tempo of the FARP include the number of helicopters operating, distances required to travel, loads required for each helicopter and duration of the operation. For example, heavy loads requiring transport over short distances means that the helicopters will not carry a full fuel load, since they require payload over endurance, resulting in frequent refuelling. This would mean the FARP OIC and AMC require a good stagger into the FARP and sufficient fuel to sustain the operation. FARP crews work continuously, requiring replacement personnel to enable rest. On the other hand, a squadron task for a single lift mission requires a single turn around through the FARP for numerous helicopters. This results in a single peak period, a holding area as helicopters wait their turn, and sufficient fuel to provide all helicopters at once.

7. A FARP should be set up if the distances between the area of operation and the logistics support exceed 30 kilometers. Thirty kilometers is a general tradeoff distance and a planning figure. A greater distance may leave the commander with inadequate fuel, load capacity and time on station to complete the mission. The adequacy of the roads, the availability of higher echelon's ground and aviation support, and the distances to POL replenishment points affect how well the FARP can be supported and sustained. The FARP should remain in one location for only 3 to 6 hours; however, these times can be reduced or extended by the factors from the mission estimate. The size of the FARP depends on the number of helicopters using the FARP and the type of refuelling equipment (FARE or HLVW) that is available.

THREAT

8. An effective way to neutralize the effectiveness of aviation forces is to prevent helicopters from rearming and refuelling. Therefore, a FARP is a high priority target. A detailed threat assessment must be carried out to ensure that adequate protection and the site location provides a good level of protection.

9. The survivability of a FARP in a threat environment depends on mobility and the ability to displace rapidly. Careful site selection, effective camouflage, and minimum personnel and equipment result in an austere, yet mission capable FARP.

COMMAND, CONTROL AND COMMUNICATIONS

10. **Command**. The OIC is responsible for the overall success of the FARP.

11. **Sqn Ops O**. The Sqn Ops O assists in executing the AMC's plan, which may include deploying and operating a FARP. Either the AMC, D/AMC or Sqn Ops O require consultation with the Log Sp Flt and Maint Flt Comds to ensure that the plan can be supported logistically.

12. **Log Sp Flt Comd**. The mission of the Log Sp Flt Comd is to provide the fuel and ammunition calculated by Sqn Ops. Requirements are then coordinated with higher headquarters to ensure that the supply meets the demand.

13. **Helicopter Control**. Control of the helicopters within the FARP is important. The proximity of the FARP to the battlefield restricts the use of electronic methods for positive helicopter control. The most effective means of control is a thorough briefing and well written standing operating procedures that outline the FARP procedures to be followed by both aircrew and FARP personnel.

14. **Air Traffic Control**. The use of ATC in a FARP is estimate dependent. Under some circumstances, such as during OOTW operations, ATC can provide the aviation commander with a measure of safety and synchronization. ATC can manage the flow of helicopters for a faster, safer, and more efficient operation. The communications equipment that the team should have must allow them to contact the helicopter using the FARP plus any communications for coordination of airspace. This includes VHF/AM and FM plus UHF and possibly HF radios.

15. **Visual Signals**. Visual signals include hand and arm signals or lights. Ground guides control the movement of helicopters within the FARP. Because ground guides may direct allied helicopters, they must use standard hand and arm signals as per the standard NATO marshalling signals.

a. flashlights and light wands are primary visual signals. The flashlight can be used with colour coded disks to relay information. A separate coloured disk, which is easily seen at night, can indicate the FARP situation or supply availability. During daylight hours, signal flags of different colours can serve the same purpose. Flashlights can be used with hand and arm signals; however, the use of a light to relay information may violate light discipline policy. For NVG operations, the use of various coloured lights is ineffective because NVGs do not differentiate colours. Light wands can be used for hand and arm signals as well as to mark departure, landing, and arming and refuelling points;

b. chemical lights come in a variety of colours to include infrared, which can be seen through NVGs. They can be used in the same manner as flashlights and light wands. An effective technique for lighting the landing area using chemical lights is to dig a shallow trench in the shape of the landing area and place chemical or beanbag lights in the trench. The landing area can be seen only at a certain angle from the air. On the ground, it is difficult to see; and

c. lights should be turned on or made visible just before the helicopter arrives and turned off or removed when the helicopter departs.

TRAFFIC LAYOUT

16. Standard markings on departure and arrival points will improve the procedural control of helicopters. Chemical lights, or beanbag lights can be used at night to indicate the desired direction or helicopter movement or the location of ground guides. The helicopter should move to the ground guide's location and follow directions for arming and refuelling. After the helicopter has been serviced, the ground guide should direct it toward the departure end of the FARP. Figure 10-1 shows an example of a FARP helicopter traffic flow, from the safe point, to the refuelling area, to the arming point.

17. Additional helicopter control can be achieved by maintaining integrity of the helicopter section or element during FARP operations. Selected waiting areas and separate in and out routes also improve helicopter control.

18. **Communications**. The use of radios must be kept to a minimum to reduce the enemy's ability to target and engage electronic emissions. However, each FARP should have two FM radios capable of secure voice transmissions. With these radios, personnel can monitor an internal net and a command net. The internal net would provide personnel with information about the current status of inbound helicopter and ammunition requirements. The command designated net would provide information that may affect the FARP's operation.

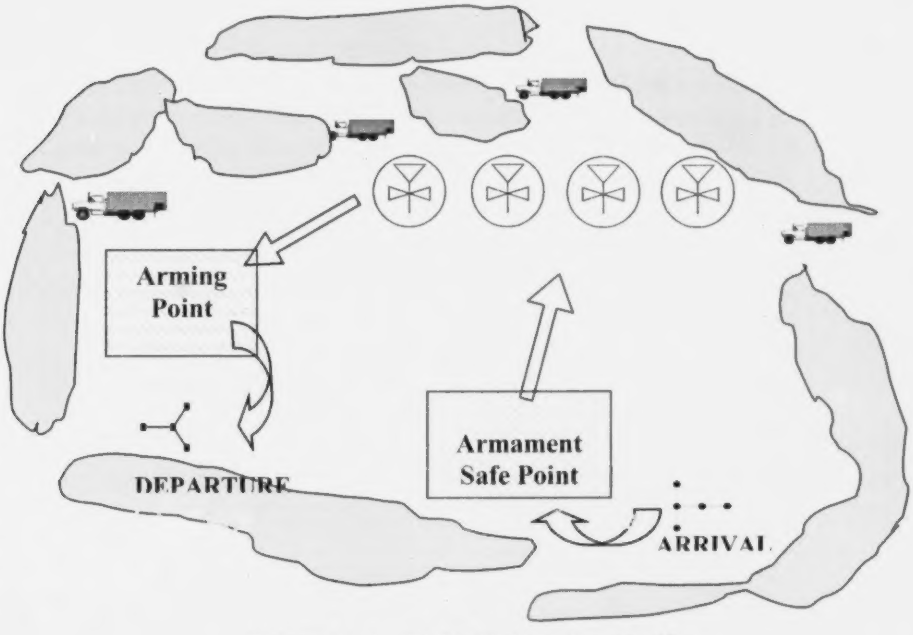

Figure 10-1. FARP Helicopter Traffic

19. Because FM radios are limited in range, the distances and location of the FARP may prevent FARP personnel from monitoring or transmitting on the designated command frequency. In such cases, the use of helicopters as re-transmitters is an option as long as the risk factors are considered. These radios should be used to transmit only when:

a. the FARP is under attack;

b. the FARP relocates or ceases operation;

c. the FARP is not operational at the scheduled time;

d. a request is made to re-supply; and

e. the status of the FARP changes. (In this case, the radio is used to send a SITREP).

20. Radios are used only after helicopters have departed the FARP and then only as necessary. When possible, outbound helicopters should relay critical messages from the FARP to the squadron headquarters. FARP reports and other communications should be made in person.

LOCATION

21. The FARP should be located as close to the helicopter's AO as the tactical situation permits. It is usually located as far forward as 15-25 km from the FEBA and within the supported brigade's AO. This location increases helicopter time on station by reducing the travel times associated with refuelling. If possible, the FARP is kept outside the threat of medium artillery. Movement and resupply of the FARP is conducted by ground or aerial means. Fuel is normally supplied by squadron bowsers, however, during coalition operations, an MTH can sling up to five 500 (US) gallon bladders into a FARP.

22. Aviation's ability to move quickly requires that the FARP also be able to move quickly to maintain support. The situation depends on whether the FARP is austere and mobile, or static. In the static locations, the FARP may be given the time and assets to harden itself for additional protection. Some factors to consider when locating a FARP are:

a. **Enemy**. The enemy situation must be considered so the location provides the best protection. In a forward deployed location the enemy's weapons systems and tactics must be considered. In a rear area operation the activities of Special Forces or sympathizers must be known. In a PSO the activities of the belligerents must be understood;

b. **Terrain**. A good FARP location allows for the tactical dispersion of helicopters and vehicles. Tree lines, vegetation, shadows, and urban areas should be used to conceal FARP operations. Terrain folds and reverse slopes should be employed to mask the location from observation. Main supply routes and air avenues of approach must be masked so the location cannot be targeted electronically or visually. There same factors apply to the selection of any holding area that is required;

c. **Friendly Forces**. The Maint Flt and the Log Sp Flt Comds must determine if enough personnel are available to operate the FARP and conduct resupply. Also, the proper personnel skills must be available in the proper numbers. Depending on the location of the FARP, the number of soldiers required to provide security varies. Preferably an infantry unit is tasked for protection of the FARP but in some cases, squadron personnel have to provide FARP security; and

d. **Time**. The longer the aviation mission, the more security and supplies the FARP requires. Planners must consider how long it takes to drive or fly to the proposed FARP site. They must also plan how long it takes to set up the site and how far the site is from the main supply routes. The FARP should remain in one location for three to six hours.

23. The aviation squadron provides the ground commander with a rapid reaction force that can quickly shift its efforts and engage enemy forces in rear areas. Depending on the distance, the helicopter may require FARP support. A FARP located in the rear areas can remain in one location longer than the recommended three to six hours. In these instances and during a Peace Support Operation, pre-positioning FARE equipment at likely locations or pre-inspection of likely FARP locations can be carried out to reduce the time for deployment and briefing procedures.

EMPLACEMENT

24. Due to the size and quantities of materiel at a FARP, emplacement is usually carried by ground vehicles. Air assets can be utilized to replace a FARP when time is critical. The FARE, limited fuel, the advance party and the security team can be air lifted in to await the main supply vehicles.

25. There may be instances where the location for a FARP is inaccessible to vehicles and a limited refuelling capability is required. These situations may occur where one or two helicopters are operating at a time in remote locations and fuel is required to extend the AO. These types of sites can be set up and resupplied using two helicopters and multiple lifts.

MOVEMENT PLAN

26. The movement of the FARP should be planned to include an advance party, movement tables, a route reconnaissance, and alternate site locations. Detailed planning of the move improves the accuracy of the FARP's operational time. Planning should include details about individual vehicles and trailer load plans.

27. An advance party and, if required, a security team should be sent to the proposed site determining its suitability. If the site is not suitable for FARP operations, then time should be available to move the FARP to an alternate location. If the site is usable, the advance party identifies areas for the placement of equipment. When the remainder of the FARP personnel and equipment arrive, the advance party guides each vehicle into position.

28. A sentry should be posted on each vehicle and in a dismounted position to warn of approaching aircraft. They should be rotated often because scanning for long periods dulls an individual's ability to spot approaching aircraft. Vehicle horns are the standard method of warning for an air attack.

SECURITY

29. The FARP should have enough internal security to defend itself against the anticipated threat. Too much security equipment is too bulky and hinders the movement of the FARP; however, inadequate security robs it of its ability to protect itself long enough to move. Coordination may be required to receive additional protection from the supported brigade if the threat dictates.

30. In some instances, air defence systems may deploy with a FARP for protection against an air threat. If this is the case, airspace coordination is required to ensure that friendly aircraft are not engaged and to allow the AD assets positive identification of friend or foe. Where the AD assets are deployed depends on the terrain, but they should be no closer than 3 km to provide standoff protection. An AD liaison officer should be consulted for the optimal layout and procedures.

31. If the FARP is attacked, the personnel must be able to execute a denial plan. A denial plan increases personnel survivability and allows personnel to regain control of the situation.

RELOCATION

32. Several guidelines determine the relocation of a FARP. Situation dependent, it should only be in a single location for no more than approximately 3 to 6 hours. If it is moved, it should only do so after it has fulfilled the support requirements of the mission helicopters, remembering that the helicopters are the paramount factor. A FARP may be relocated for any of the following reasons:

a. the FARP comes under attack;

b. an order to relocate is received from sqn ops by radio or face to face with authentication;

c. a pre-planned relocation time has been set;

d. a pre-planned specific event occurs, i.e. after servicing a specific flight or number of helicopters; and

e. the last element to use the FARP delivers the message to relocate.

33. If time allows, a map reconnaissance and survey of the proposed site should be conducted before a FARP site is selected. A site survey is important, since maps may not be current and sites are not always as they are depicted on the map.

34. **Advance Party Actions**. The advance party breaks down into a single unit consisting of a communications vehicle, the FARP OIC, radio operator and two to three personnel to assist in the site reconnaissance. Depending on the size of the FARP and the length of time for the move to the new location, part of the refuelling assets may be taken to act as a Rapid Refuelling Point until the main equipment arrives. The remaining personnel and equipment may be required to continue operations while the advance party is conducting its movement and reconnaissance or the FARP may be torn down and prepare to move once the order has been given by the OIC.

35. Once the advance party arrives at the new location, security is set up, the site is reconnoitered and if suitable, a site plan is made. If the site is unsuitable, the Squadron is notified and an alternate location is requested. When the site is deemed suitable, the advance party:

a. determines the landing direction;

b. determines and marks refuelling and rearming points, truck emplacement and/or bladder emplacement; and

c. sets up any equipment available.

36. Once in place, the remaining FARP elements are called forward, breaking down the FARP in accordance with WUSOPs. When the new elements arrive at the new site they are directed to their specific locations by the advance party and the refuelling points are set up.

SITE PREPARATION

37. The FARP site is swept for FOD before operational use. Sticks, stones and other potential FOD hazards are removed to prevent injury to personnel or damage to equipment. In addition, some brush and small trees may need to be removed from landing and take-off areas. The use of pre-designated landing, takeoff, and hovering areas will minimize accident or incidents. The areas around the rearming and refuelling points and the pump assemblies should be cleared of dried grass and leaves to prevent potential fires.

38. Helicopters may sink into wet, snow covered, thawing or muddy ground. A good rule of thumb is that if the ground can support an MLVW then the ground will support a UTTH.

SUPPORT EQUIPMENT

39. Standard support equipment for the conduct of a FARP includes a fire extinguisher located at each refuelling nozzle, and at the pump and filter assembly. A water can and waste fuel pan is located at each refuelling point. This is to enable operators to wash fuel off skin and clothes, wash dirt off fuel nozzles and contain fuel if a spill occurs.

40. A waste fuel pan is required to limit fuel spillage at each nozzle. Fuel spills will be recovered. A Spill/HAZMAT Team is located at the FARP location to contain and clean up any spills that do occur.

REFUELLING OPERATIONS

41. **Site Layout**. The setup of the FARP should take advantage of terrain features, achieving maximum dispersion, avoiding obstacles and maximizing cover. When planning the layout, consideration must be taken for the minimum spacing between helicopters during refuelling. The minimum hub to hub spacing for most NATO utility helicopters is 25 meters. Several FARP layouts are depicted at Figure 10-2.

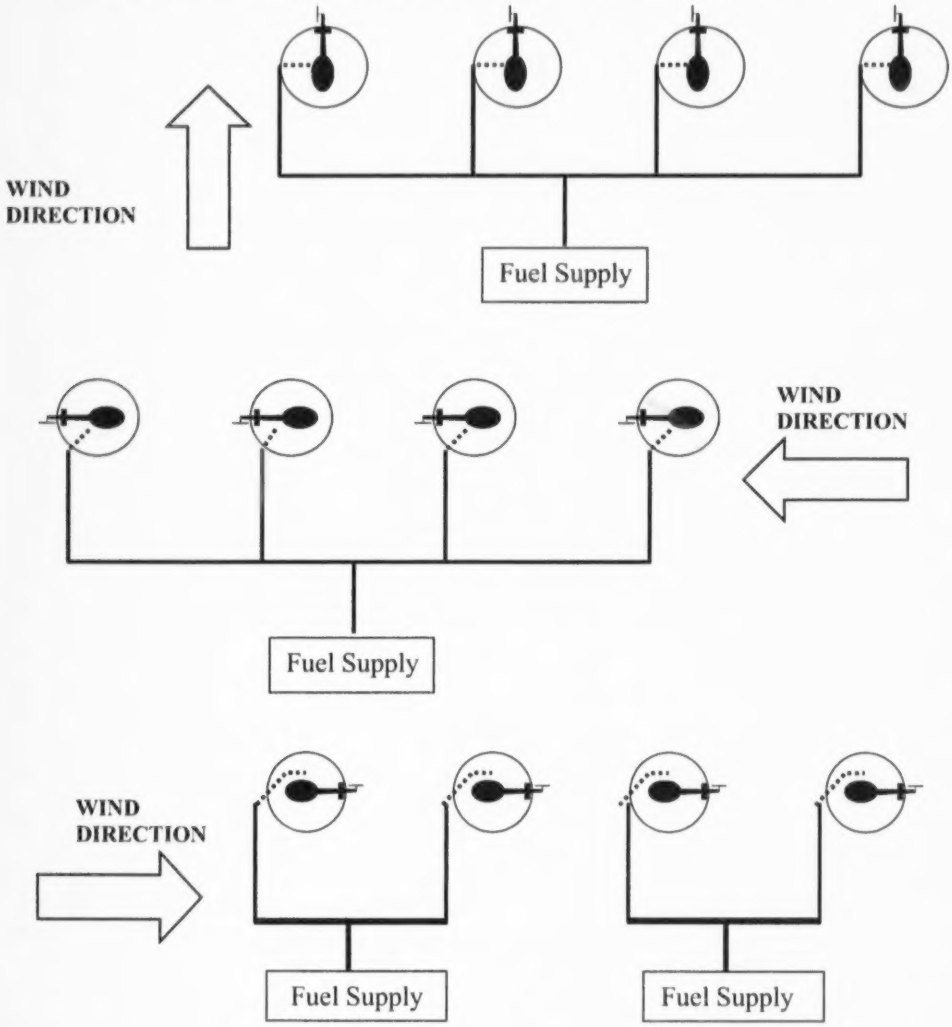
WIND
DIRECTION
Fuel Supply
WIND
DIRECTION
Fuel Supply
WIND
DIRECTION
Fuel Supply
Fuel Supply

Figure 10-2. FARP Setup Under Different Wind Directions

PERSONNEL REQUIREMENTS

42. Three personnel are required to refuel a helicopter. One ground crew, operates the nozzle, the Flight Engineer (or if no FE is available the Co-pilot) acts as fire guard for the nozzle man, and one ground crew remains in front of the helicopter as the marshaller/ safety person. One person remains at the bowser or at the FARE pump for emergency shutoff. The marshaller/safety person remains outside of the rotor disk at a point where both the pilot at the controls and the refueller with the nozzle can be observed.

43. OIC FARP's responsibilities during refuelling operations are to ensure that all procedures are being followed and that the operation is being conducted in an effective manner. Coordination between the refuelling parties, ATS and the Holding Area(s) to ensure priority helicopters are cycled through quickly or fuel critical helicopters (helicopters that are very low on fuel) are serviced is one of the main duties of this position.

44. Personal equipment requirements for refuelling operations includes proper uniform, goggles or some sort of face/eye protection, hearing protection, gloves and proper safety boots.

45. If a refueller's clothes become soaked with fuel, the refueller must:

a. discontinue refuelling operations and leave the area immediately;

b. wet clothes with water before taking them off; and

c. wash fuel off the skin with soap and water as soon as possible.

DEFENCE

46. **Enemy Detection**. FARPs are detectable by various means, over flights, electronic, thermal, infrared, radar or human intelligence. It is for this reason that FARPs are best moved on regular, short intervals.

47. **Defensive Measures**.

a. **Camouflage**. Camouflage is important to prevent detection of the FARP. Camouflage netting should be used when possible; however, its use may interfere with the rapid deployment capability;

b. **Concealment**. FARP positions should be selected that offer natural cover and concealment. Cover should be placed on windshield and headlights. Vehicles and equipment should be placed under trees, bush, and hedgerows or parallel to the tree line and in the shadow of trees. When shadows are used, repositioning of vehicles and equipment may require repositions during the day. Figure 10-3 shows a tactical FARP layout utilizing local vegetation;

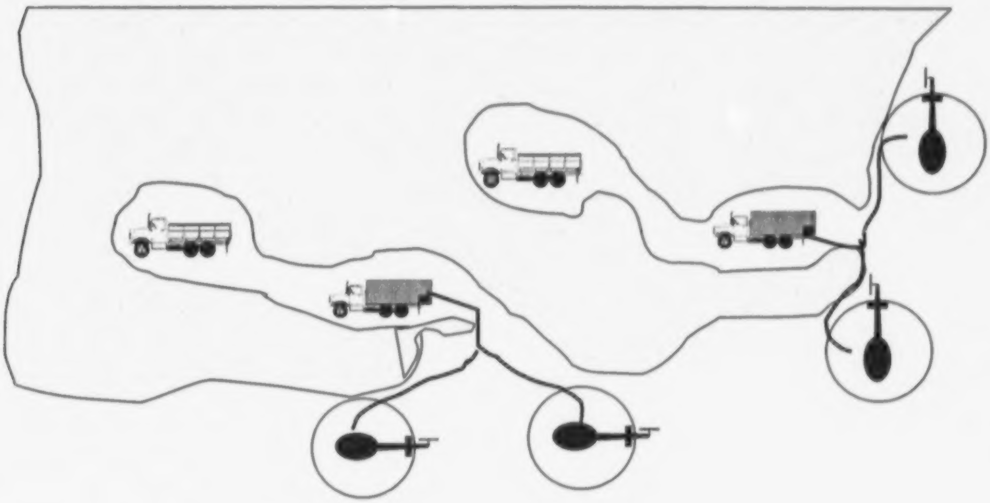

Figure 10-3. FARP Use of Vegetation

c. **Emission Control**. Communications must be kept to a minimum. Aircrew should be familiar with and use approved approach and departure procedures. The operation of any power equipment, such as pumps, should be delayed until the last possible moment. This reduces the chance of infrared and acoustical signature cues being observed;

d. **Track Discipline**. During setup, vehicle movement should be kept to a minimum to reduce the number of tracks made through the grass and dirt. Hoses if possible should be curved so as not to stand out as a straight line, which is easy to observe from the air;

e. **Urban Emplacement**. Placing a FARP in an urban site has both benefits and hazards. The increased risk from wires and poles is a hazard to helicopters. Benefits include the ability to hide equipment amongst buildings which makes it more difficult to detect from the air as they form to the surrounding area. The road network is also beneficial to hiding the movement of vehicles;

f. **Security**. Ground security measures begin with the advance party. They should start local security as soon as the site is selected and approved;

g. **Mobility**. The FARP must be placed to ensure rapid setup and preparation for movement while still maintaining its mission;

h. **Deception**. The enemy understands the importance of FARP operations and will be looking for them. Deception misleads the enemy by manipulating, distorting, or falsifying friendly actions, causing the enemy to deplete its resources by attacking false targets and missing intended targets;

i. **Hardening**. This reduces the effects of any attack on the FARP. The effects of an attack can be reduced by careful site selection and digging in vital equipment like hoses, pumps and bladders;

j. **Redundancy**. When possible, additional FARP assets should be deployed. This may be in the form of additional bowsers located near but not in use, multiple pumps being used in case of one being damaged and additional hoses. It may also include the placement of a silent FARP in an alternate location, to be used only in the event of the main location being disabled; and

k. **Dispersion**. When the terrain is not suitable for concealment, dispersal of equipment and refuelling points can make the site a less lucrative target. Varying the patterns of the deployment avoids typical patterns that allow easy detection/ identification.

48. **Field Artillery**. When planning for a mission, the AMC and the Sqn Ops O must consider the protection of the FARP when planning for fire support. The Field Artillery Commander, or his staff, and the Sqn Ops O must coordinate gun and FARP positions so the in and out routes can be planned to not conflict with any protective fire that must be utilized.

49. **Engineers**. Engineer support may be available or required in the setting up of a FARP. Because of the time and labor required to dig in or protect a FARP with engineer support, it is not usually used in mobile operations. Although, in PSO missions or for semi-permanent or long term refuelling locations in war it may be beneficial to have the engineers assist in the defence by digging in vital pieces of equipment like bladders, pumps and ammunition storage areas. It must be remembered that whatever is used, the mobility of the FARP must not be jeopardized. It is the job of the AMC and Sqn Ops O to consider the usefulness of engineer support and to request it when possible if mission analysis deems it necessary. Engineers can be used to:

a. prepare pre-planned FARP sites;

b. construct, maintain or improve access roads into and out of a FARP site;

c. spray dust suppressant;

d. clear areas for passage of vehicles and helicopters (ground handling);

e. build protection for fuel and ammunition caches (berms, dugouts, fences);

f. prepare buildings in urban areas to house FARP equipment (bowsers); and

g. advise and assist in field fortifications.

SQUADRON COMBAT SERVICE SUPPORT

50. During mission analysis, CSS requirements are considered. The Log Sp Flt Comd should be kept abreast of future missions and tempo of operations for the squadron through the Sqn Ops O. Due to the lead time required, POL stocks for the squadron must be kept supplied at all times to offset unplanned higher tempos.

51. Once a mission commences, the FARP must continuously update the squadron with the fuel state and advise of any shortfalls that may be forecasted. If at all possible, any resupply of the FARP should be done during a lull in combat or when vehicles can be protected from enemy observation and indirect fire (night movements). The status of the FARP supplies must be passed to the AMC to ensure he is kept abreast of any impact shortfalls may have on the completion of the mission.

52. Two factors that determine the amount of fuel required in the FARP are: the total number of helicopters to be supported and the duration of the mission. The mission fuel can be calculated as follows:

> Mission duration X (times) the number of helicopters requiring fuel (100% serviceability) X fuel consumption in litres (or pounds) per hour. (A general rule of thumb for the CH 146 is 720 pounds per hour or 400 ltrs per hour).

OPERATIONS OTHER THAN WAR (OOTW)

53. During OOTW, security may not be as much of a concern as supply lines and means of transport for FARP supplies. In these operations, the supply lines may be long and complex, especially with PSO, therefore FARPS may have to be located out of fixed locations or airheads. Fixing at a single or reusable area allows for greater security if required equipment can be established and maintained without undue transport and logistics. Depending on the situation, in a PSO, pilfering of supplies, especially fuel, may require the site to either be guarded continuously or set inside a secure area.

NIGHT OPERATIONS

54. The establishment of a FARP at night requires special considerations. Movement of the FARP must be planned in detail and executed in an orderly manner. Delays occur because of low light levels. Depending on the threat, light discipline is extremely important, and personnel must guard against the tendency to ignore it.

55. Once the FARP is in location, it must remain blacked out until the helicopters arrive. Use of pre-arranged signals or calls should be used to advise the FARP of inbound helicopters so that FARP personnel can turn on light markers.

56. During night operations, the FARP location should be set up to ensure minimal helicopters manoeuvring into and out of the refuelling point. The best system is a fly through design where helicopters can approach and depart along the same route.

COLD WEATHER OPERATIONS

57. FARP operations are made more difficult during cold temperatures. These difficulties are with both equipment and personnel and must be planned for by commanders. Snow, ice and mud may reduce vehicle mobility, complicating FARP movements. During cold temperatures, the breakdown and setup of the FARP takes more time than in other environments.

58. Low temperatures make it difficult for FARP personnel to keep warm and function. Wind chill caused by helicopter rotor wash results in cold injuries even when air temperatures are not in the critical range. Fuel accidentally spilled on bare skin or soaked into clothing has a cooling effect as it evaporates, increasing the probability of cold injury. The handing of nozzles and ammunition requires mittens or other protection to ensure skin does not stick to the metal. Finally, during cold operations, static buildup is increased, so good grounding of both man and equipment is vital. If the ground is frozen, the placement of grounding rods may be difficult and time consuming. It is also difficult to get a good ground, so salt water may have to be poured down the grounding hole to get a good contact.

59. Marking of the FARP is made more difficult in snow. Marker panels or lights can become obscured by falling snow or sink into the snow and become invisible. Manoeuvring helicopters can cause whiteouts, making movement for all helicopters a well planned and controlled operation. Re-circulating snow can also be an indicator to enemy of the location. These problems can be minimized by packing down the snow prior to helicopter arrivals.

60. Camouflage of the FARP can become difficult, especially where there is complete snow cover. The use of white covers is possible, but the best solution is to avoid open areas. Site the FARP along green tree lines or in urban areas.

61. Maintenance requirements for helicopters and FARP equipment is increased. Fittings break, hoses become brittle and hard to position and bladders are difficult to fold. If icing occurs, FARP personnel may have to de-ice the helicopters. In very cold temperatures, the FARE is difficult to start and may have to be pre-heated.

CHAPTER 11

AEROMEDICAL SUPPORT

GENERAL

1. Commanders of medical units in a theatre of operations use their resources to effectively evacuate and treat sick, injured and wounded soldiers. A soldier's survival, when wounded on the battlefield often depends on the time it takes to receive treatment. Quick, responsive care is essential to protecting the lives of injured land force personnel. Under current Canadian Forces structure, no dedicated aviation assets are attached to Field Hospitals or formations for medical support missions. However, a squadron supporting a formation or an operation provides dedicated helicopters and aircrew on standby for casevac/medevac operations.

DEFINITIONS

2. The distinction between the terms MEDEVAC and CASEVAC must be clear in order to understand aviation's support to medical services. The two aeromedical support missions are defined as follows:

a. **Medical Evacuation** (MEDEVAC). MEDEVAC is defined as the timely, efficient movement and **en route care by medical personnel** of wounded and injured personnel from the battlefield and other locations to medical treatment facilities (i.e. hospitals). The term MEDEVAC refers to both ground and air assets. MEDEVAC assets are permitted to mount the Red Cross and are protected under the Geneva Convention, Law of Armed Conflict. No MEDEVAC helicopters are permitted to transport troops, combat supplies or act in support of a combat operation not directly attributed to the provision of medical services; and

b. **Casualty Evacuation** (CASEVAC). CASEVAC is defined as the movement of casualties to initial treatment facilities and/or to medical facilities in the combat zone. **It does not include en route care by medical personnel**. CASEVAC should only be utilized when a unit has a large number of casualties (i.e. when the number of casualties exceeds the ability of the MEDEVAC helicopters) or when MEDEVAC helicopters are not available. CASEVAC helicopters are not protected under the Geneva Convention and are not permitted to mount the Red Cross. They may be fired upon as hostile aircraft. The CH 146 will normally only conduct CASEVAC missions (see para 6).

CASEVAC SUPPORT FOR OPERATIONS

3. Requesting CASEVAC helicopters is determined by the land force commander. If MEDEVAC helicopter support is insufficient to meet the requirements for the evacuation of casualties, or it is not available, then a request for CASEVAC support should be made. Whether these helicopters are dedicated MEDEVAC support to the formation or CASEVAC,

they receive their missions through the division or brigade G3 Aviation. Regardless of the task organization, the ground commander requesting CASEVAC support must understand the medical limitations provided en route to the treatment facility. The job of ensuring that this is clear to the ground commander is a responsibility of the ALO dedicated to the formation HQ.

4. **Advantages** of helicopters in the casualty evacuation role:

   a. speed and range make it possible to move casualties by air relatively long distances in a short period of time;

   b. the ability to move patients quickly over rough terrain and get in to areas ground ambulances may otherwise be unable to access; and

   c. because of the range and speed, casualties can be transported to the medical facility that can best deal with the patient's condition.

5. **Disadvantages** of using helicopters in the casualty evacuation role:

   a. no en route medical care in CASEVAC;

   b. helicopters are taken away from performing other essential combat missions; and

   c. helicopters in the CASEVAC role are not protected under the Geneva Convention.

CH 146 CASEVAC CAPABILITIES

6. The CH 146 can provide CASEVAC support to the brigade and the division. The number of casualties that can be transported by the CH146 varies depending on the helicopter configuration (i.e. seats in or seats out, other equipment that may be on board the helicopter) and the urgency of the situation. Additionally, the severity of the wounds of the casualties, as determined by the medical personnel or battalion medics, may determine the allowable cargo load (ACL) for the helicopter for particular missions. CH146s can expect to be utilized as far forward as possible to evacuate casualties.

7. For planning purposes, the CH146 casualty loads are:

   a. Standard configuration:

      (1) three stretchers on the left side; and

      (2) four walking wounded maximum; and

      Note: If a medical attendant accompanies the wounded, then the number of walking wounded is reduced to maximum of three.

   b. Emergency MEDEVAC configuration*:

      (1) six stretchers, three on each side; and

(2) one medical attendant (helicopter trained).

*Note: This configuration is only utilized in mass evacuations and requires personnel trained in loading and unloading helicopters.

EVACUATION OF CASUALTIES DURING AIRMOBILE OPERATIONS

8. **General**. During airmobile operations the AFC/ LUC staff and aviation squadron plan for the utilization of lift helicopters to evacuate casualties from the landing zone. Airmobiles with multiple lifts have the AFC plan for the lifting helicopters to pick up casualties during successive lifts. On single lift operations, helicopters are designated to remain on standby for CASEVAC operations. These helicopters normally standby at a central location, most likely the PZ, FARP, or an established holding area.

9. **Mission Planning**. The evacuation of casualties on an airmobile requires detailed planning in order to execute it successfully. During the planning stages of the airmobile, the brigade G3, the AMC, the Sqn Ops O and the ALO are all involved in the planning. If the AFC's intent is to evacuate casualties, then the planning must include the following considerations:

a. **AFC's Intent**. The AMC must inform the AFC of the tradeoff between using lifting helicopters and continuing with the airmobile insertion. If the lifted unit takes casualties early in the operation, it may become necessary to reduce the amount of lifting helicopters in order to accomplish casualty evacuation. The AFC should determine the number of helicopters that can be bumped from the air movement plan to pick up casualties. A decision may be made not to bump any and conduct all CASEVAC after the force has been completely inserted or, helicopters may be designated in each lift (i.e., the last two helicopters) for casualty evacuation from the LZ. The AMC and the LUC understand the AFC's intent on casualty evacuation and advise on courses of action;

b. **Casualty Locations**. The LUC should designate an area in the LZ where casualties are to be brought. This facilitates rapid movement and minimizes ground time in the LZ for the helicopters. The casualty point must be designated and all members of the land force must know its location. The aircrew, as they arrive at the LZ, are able to focus on the casualty point and will be prepared to accept casualties;

c. **Signalling**. Night operations provide a significant challenge for evacuation operations. Light signals should be planned so the helicopters arriving at the LZ can be prepared to accept casualties. For example, a flashlight or chem lite coming from the designated LZ casualty location may indicate that there are casualties to be removed. This way the aircrew know that they must remain on the LZ and be prepared to accept casualties;

d. **Communications**. Once established in the LZ, communications on the aviation net or a pre-designated radio net can alert the flight of the necessity to evacuate casualties from the LZ; and

e. **Designated Area For Dropping Off Casualties**. The AFC must decide where to transport casualties if they occur during the airmobile. Options include the PZ, a medical station or another designated area. Considerations for selecting a casualty collection point should be:

(1) **Casualty Status**. A site should be selected that is secure and has medical personnel ready to accept casualties,

(2) **Helicopter Availability**. Helicopters conducting casualty evacuation separate from the serial at some point. The AFC must be prepared to effect the bump plan if the helicopters carrying casualties do not arrive back at the PZ for the next lift,

(3) **Confusion**. A casualty collection point should be selected so it does not interfere with the airmobile that is still in progress. Helicopters arriving at the PZ full of casualties may cause confusion on the PZ as troops are trying to load and casualties are being unloaded, and

(4) **Drop Off Site**. A site should be selected that allows the lifting helicopters to quickly drop off the casualty and return to the PZ to continue the tempo of the operation.

MISSION PLANNING CONSIDERATIONS

10. The air movement planning considerations that are listed in Chapter 6 apply to medical evacuation operations as well. Units conducting these missions should refer to this chapter to more thoroughly plan and accomplish the mission. In addition, the following mission planning considerations should also be considered when preparing to conduct a medical evacuation mission:

a. **Landing Zones/Pick-up Zones**. LZs /PZs for CASEVAC operations are the responsibility of the supported unit. For example, battalion aid stations are responsible for setting up the LZ/PZ for evacuation operations. LZ/PZ selection criteria for the LZ/PZ follows:

(1) **Location**. The LZ/PZ must be in close proximity to the aid station. Casualties may have to be carried by hand to the waiting helicopter. LZs/PZs must be located such that they do not interfere with aid station operations, blow dust and debris onto the aid station or require stretchers to be carried long distances. As a rule, the LZ/PZ should be located approximately 150 meters downwind from the aid station,

(2) **Marking**. LZ/PZ markings must be visible from the air. During the day, marking of the LZ/PZ can be accomplished using a high visibility orange panel (either worn by a ground marshaller or firmly fixed to the ground away from the actual landing site), smoke or a signal mirror. At night, a “T” or an inverted “Y” is used to designate the helicopter touchdown point. Proper LZ/PZ markings ensure that the helicopter can

quickly locate the LZ/PZ and results in rapid turn around times. All approach aids must be oriented so that helicopters approach and depart into wind,

(3) **Communications**. Air to ground communications should be maintained between the helicopters and the LZ/PZ,

(4) **Capacity**. LZ/PZ selection is based on the number of helicopters utilized for the evacuation operation. The distance from each helicopter should be increased from those used for troop transport to reduce the effect of rotorwash on adjacent helicopters and patients, and

(5) **Obstacles**. LZs/PZs should be free of obstacles more so than with troop transport. Obstacles such as cables, wires, antennas, large rocks, excessive slope and large ruts can make the location unsuitable. Obstacles that can not be cleared from the location should be marked. If communications are maintained with the aircrew, then advisories should be provided to the crews as to hazards in the LZ/PZ;

b. **Medical Support**. As defined, CASEVAC operations do not provide any en route medical treatment. Commanders and medical personnel must consider this when determining if helicopters should be used to transport casualties;

c. **Stretchers**. Aircrew conducting aeromedical support operations must be told what to do with stretchers. Helicopters may need to pick up stretchers at the drop off location and return them to the casualty PZ; and

d. **Airspace**. If the division has MEDEVAC helicopters under OPCON or attached to it, the Division HQ is responsible for planning the required airspace measures. Helicopters conducting MEDEVAC/ CASEVAC missions should check with the Division for the current medical evacuation airspace structure. These procedures are also specified in the ACO.

CHAPTER 12

SPECIAL OPERATIONS

INTRODUCTION

1. Special operations are those which do not typically fit into other combat mission categories but which by their nature, may involve a high degree of risk. Combat Search And Rescue (CSAR), deep insertions and extraction of Special Forces personnel, and special intelligence gathering are some of the activities carried out in this mission area (see Chapter 6 for tactical insertions). Helicopters performing these missions are normally equipped with advanced systems and weapons and are crewed by specially trained personnel. Special operations can involve any of the tactical aviation basic tasks. Many coalition countries operate helicopter special forces, but not Canada.

CSAR

2. CSAR is not an operational task conducted by the CF. It is detailed in this chapter to reflect the doctrine of other coalition members, such as US Army Aviation, and in order that CF aircrew will be familiar with this coalition operation. CSAR is a coordinated operation using pre-established procedures for the detection, location, identification and rescue of downed aircrew in hostile territory, in crisis or wartime. Combat experience has demonstrated the importance of commanders at all levels to plan for combat search and rescue of downed pilots.

3. The recovery of downed aircrew and aircraft is secondary to the accomplishment of the mission. Although an immediate response would be ideal, since it usually increases the probability of survival and evading capture, mission accomplishment is the priority.

CSAR IMPERATIVES

4. **Immediate Recovery**. The sooner that downed aircrew are located and rescued, the greater their chances of not being captured as a PW and the better the chance of surviving any injuries.

5. **Detailed Planning**. CSAR operations must be planned in detail. For operations that are cross FLOT, this is essential. Helicopters are integrated into operational plans for use as CSAR platforms. All aircrew must understand the immediate CSAR procedures established for a particular mission.

6. **Decision Process**. A decision of whether or not to launch a CSAR mission if aircraft are lost must first be made. This decision must be made rapidly, but with caution. One does not want to lose more aircraft by committing assets into a high threat area where more losses could result.

7. **Use of Available Resources**. If an immediate CSAR is launched, consideration must be given to the availability of aircraft/ helicopters to escort the rescuing aircraft, fire support and EW assets that are available to support the operation.

CSAR OPERATIONS

8. CSAR operations can be placed into two separate categories, immediate and deliberate. Commanders must recognize and prepare for both types of CSAR operations.

a. **Immediate**. Immediate CSAR is the rescue of downed aircrew during the conduct of a mission. For example, during an airmobile, immediate CSAR would be accomplished by having an empty helicopter available to follow along to rescue downed aircrew. Immediate CSAR is the most effective method because friendly aircraft are in the area, enemy forces have not had the opportunity to react, and medical treatment, if required, will be most beneficial. Certain factors must be considered when planning for immediate CSAR:

(1) **Continuation of the Mission**. Immediate CSAR may take helicopters away from the primary mission. Commanders must consider the intent of the mission and decide if it is feasible to take a helicopter away from an ongoing mission to conduct an immediate CSAR mission. If the mission is an airmobile, then the aviation mission commander must consult with the AFC prior to executing immediate CSAR,

(2) **Pick-Up Helicopters**. Specific helicopters may be designated with the responsibility to conduct immediate CSAR, or the responsibility may fall on the nearest helicopter in support of the downed aircraft,

(3) **CSAR Helicopter Location**. The helicopter(s) designated for immediate CSAR may be a part of the mission and formation, or it may be a spare helicopter. The commander must decide where to position the CSAR helicopter so it can best support the pickup of downed aircrew and not interfere with the ongoing mission, and

(4) **Airspace**. Separate airspace control measures may be developed to allow CSAR helicopter(s) to extract downed aircrew without interfering with the ongoing mission. If the CSAR helicopter uses the same structure as the mission aircraft, then effective C2 must be established to deconflict aircraft.

b. **Deliberate CSAR**. Deliberate CSAR is planned as part of an operation, however, the AMC may utilize internal assets to conduct deliberate CSAR. Deliberate CSAR will normally occur after the completion of the current mission and includes a detailed plan for conducting rescue of downed aircrew. Helicopters designated as CSAR helicopters must be integrated thoroughly into the plan. Planning considerations for aircrew conducting a deliberate CSAR mission are as follows:

(1) **Concept of Operations**. Aircrew designated to provide CSAR coverage must understand the operations that they are supporting. If the helicopter is not supporting the parent headquarters, then it should be placed under OPCON of the operational commander. Aircrew must be integrated into the planning process and attend all plans, orders and rehearsals. CSAR concepts may include:

  (a) the CSAR helicopter moving as part of the operation, following manoeuvre elements and maintaining a stand-off distance to provide CSAR coverage if necessary,

  (b) the CSAR helicopter moving forward to a holding area and waiting a call to move forward and conduct CSAR if necessary. Using this method, the commander may elect to establish a restricted operations zone for the CSAR helicopter, so the helicopter can stay airborne, and

  (c) the CSAR helicopter remaining at another location (assembly area, FARP) and assuming appropriate readiness condition level as determined by the commander. The commander must consider the factors of mission planning, the complexity of the concept of ops and the threat potential when considering how to utilize and plan for internal CSAR,

(2) **Communications Procedures**. Aircraft that are shot down on the battlefield may or may not be able to use the radios onboard the aircraft to communicate. The commander must consider how communications with downed aircrew will be established. Communications may not be necessary for immediate CSAR,

(3) **Command and Control**. A C2 node and an AMC must be designated for the CSAR operation. Procedures need to be devised to form the CSAR force, move the force forward and conduct the rescue of the downed aircrew. During the mission, the C2 node is responsible for coordinating fires, de-conflicting security and the rescue aircraft and controlling the rescue of the aircrew,

(4) **Signalling**. Signalling procedures must be developed. It may become necessary for the downed crew to evade and leave the aircraft site. Signal procedures must be coordinated during the planning process to allow for quick pick-up of downed aircrew,

(5) **Drop Off Location**. CSAR crews must be thoroughly briefed on the location to drop off downed pilots once they are rescued. If they are not injured, they may be returned to the aviation unit. If

injured, the crew must be taken to a medical facility. The CSAR crews should have frequencies and call signs of medical treatment facilities and have their locations programmed into their navigation devices, and

(6) **CSAR Team Make Up**. The commander must determine the make up of the team that will conduct the deliberate CSAR. The deliberate CSAR should consist of the protection assets (fighter or AH), if available, a C2 facility, and at least two helicopters for the rescue operation. Utilizing two helicopters allows for faster search times, a back-up helicopter, should the primary break down, and the ability to move more dismounted personnel for security.

CSAR MISSION EXECUTION

9. Helicopters may work with other aircraft to conduct a CSAR mission in support of an operation. In this case, helicopters would be moved forward to a holding area and be directed to the pick-up site by the aircraft conducting the search. If the downed aircrew is not located, then the helicopters will not be involved in the mission. This may not always be possible and helicopter crews should be prepared to conduct a full CSAR mission if called upon. Listed here are considerations for the execution of the CSAR mission:

a. **Intelligence Updates**. Helicopters conducting the mission should use all available intelligence sources to find out about the threat in the search area. The Sqn IO can utilize other available sources to give aircrew the most current threat situation;

b. **Information on the Downed Aircrew**. Aircrew conducting CSAR missions should have access to the following:

(1) **Isolated Personnel Reports** (ISOPREPs). An ISOPREP contains information, which is used to verify the identity of downed aircrew, in a threat environment, for search and rescue purposes. All aircrew, and any personnel who accompany them, must have a completed ISOPREP on file prior to flying their first mission into a hostile area. In the event of the downing or crash of an aircraft, the agency responsible for providing CSAR capabilities will be immediately informed of the event by telephone. The information in the ISOPREPs and the crew's evasion plan of action will then be forwarded to the CSAR agency. The Int Section will normally be responsible for holding ISOPREPs on file,

(2) **Evasion Plan of Action**. This is the plan the downed personnel will execute if immediate rescue is not available or feasible. It discusses the nearest downed aircrew recovery points the crew will move to for pick-up, signalling methods, authentication they will

use and frequencies they will have loaded into their survival radio, and

(3) **Signalling Procedures**. The signals that will be utilized by downed aircrew to call for rescue assets are usually found within the ACO;

c. **Search Techniques**. It may be necessary to conduct a search for downed aircrew. If this becomes necessary, search aircraft should utilize the following search techniques:

(1) **Boundary Method**. CSAR forces conduct the operation by designating the entire search area within the confines of prominent terrain features. The next step is to further reduce the search area into sub-elements also defined by identifiable terrain features. From the larger to the smaller scales, terrain features such as mountains, rivers, small towns/villages, secondary roads and natural or man made obstacles can be used to divide the operation. The search track will be conducted systematically within the shape of the terrain parameters until the isolated personnel have been acquired,

(2) **Grid Method**. CSAR forces conduct the operation by designating boundaries and search patterns using eight digit grid co-ordinates to define the search area,

(3) **Creeping Line Ahead Method**. CSAR forces conduct this operation by planning search routes along what is estimated to be the isolated personnel's track from isolation point to the extraction point, IAW the evasion plan. These search areas will consist of a series of connected rectangular boxes, defined in terms of length and width, initiating at the isolation point and continuing to the planned extraction point, and

(4) **Feature Trace**. CSAR forces conduct this operation by searching along specific terrain features estimated to be used by the isolated personnel, IAW their evasion plan. These features may include rivers, roads, etc. Threat lines of communication and other high traffic areas should be avoided; and

d. **Code Words/Authentication**. Once the isolated personnel are located, the rescue aircraft must be prepared to authenticate and set up the rescue operation. Once contact is made with the isolated personnel, the flight crew must proceed cautiously. Locations should be given in code, or with reference to terrain features. Threat EW assets may be monitoring so giving the location of isolated personnel on an unsecure radio net will alert the enemy to the location as well.

INDIVIDUAL CSAR PREPARATION

10. CSAR planning should begin when the squadron deploys or immediately after arrival in the area of operations. Squadron COs must place emphasis on the CSAR process and ensure that their units are prepared in the event an aircraft is lost during the mission. Procedures that should be followed to ensure aircraft are prepared for CSAR are:

a. **Single Aircraft Operations**. Consideration should be given to determine if single aircraft operations are desirable. Aircraft operating together increase the possibility for immediate CSAR. The factors of the estimate must be weighed for missions being flown to allow for the best decision;

b. **Evasion Plan of Action**. Each aircrew must have an evasion plan for missions being flown into hostile areas. It may not be possible for communications to be established once a helicopter goes down. The aircrew must be prepared to conduct evasion in case communications are not possible or the enemy situation dictates. A pre determined evasion plan will help make successful CSAR possible;

c. **ISOPREPs**. All aircrew need to have current ISOPREP cards filled out and accessible, in case they are needed;

d. **Special Instructions** (SPINS)/ **Air Control Order** (ACO). These documents provide a wealth of information, particularly with the current CSAR procedures. The SPINS and ACO will contain current authentication codes, CSAR special procedures (i.e. word of the day, colour of the day, etc), and other information. Aircrew must be familiar with these procedures prior to executing missions; and

e. **Survival Radios**. Aircrew must ensure that their survival radios are operational, have the appropriate frequencies programmed into them and know how to operate them.

CHAPTER 13

OPERATIONS OTHER THAN WAR

GENERAL

1. OOTW covers a wide range of activities ranging from humanitarian assistance to combat operations. These operations can encompass all aspects of tactical aviation missions. Aviation's ability to move quickly and to operate in austere environments allows tactical helicopters to play an important role in the conduct of OOTW. Types of OOTW include:

   a. Counter-Terrorist Operations;

   b. Counter-Drug Operations;

   c. Humanitarian Assistance;

   d. Disaster Relief;

   e. Search and Rescue (SAR);

   f. Peace Support Operations (PSO); and

   g. Domestic Operations (Aid to the Civil Power, Assistance to the Civil Authorities).

OPERATIONAL CONCEPT

2. An OOTW operation may require the deployment of an entire squadron or portions thereof, depending on the mission and the scope of the operation. The deployed aviation assets may be independent of any ground force or it may be attached to support a specific ground unit/formation, government organization or international organization/force. The supported organization/formation will vary in size and command structure. Traditionally though, helicopters that are deployed on OOTW are affiliated with an army formation/unit in one way or another. Command and control is a function of the size and make up of the operation and must be clearly understood to ensure proper support is provided.

PLANNING CONSIDERATIONS

3. Once given a mission to conduct any one of the OOTW operations, the Squadron CO and his staff face challenges that may be different from those involved in conventional operations. Some of the planning factors that COs must consider are:

   a. **Mission Analysis**. As soon as the unit receives the Wng O/ Op O, mission analysis begins. Careful mission analysis allows the CO to determine if the unit is task organized correctly to meet the mission requirements;

   b. **Task Organization**. The task organization for an OOTW is usually driven by a higher HQ through the Op O. A mission analysis must still be conducted by the CO to assess the squadron's capabilities as directed, versus the mission. It must be determined if the task organization is capable of accomplishing the assigned mission. If not, the CO must notify the higher commander and request a modification to the force so the mission and intent can be met by the helicopter unit;

c. **Command Relationship**. A helicopter unit may be deployed on an operation without their parent brigade headquarters, or a flight may be attached to another squadron headquarters from a foreign country. Further, it is possible that helicopters may work for another service or non-military agency (i.e., the RCMP). A clear understanding of the C2 relationship helps reduce confusion throughout. Determining the command relationship early allows the aviation unit to integrate with the headquarters they are attached to early, resulting in a cohesive organization during the execution phase. An immediate task for the CO or the ALO is to ensure that the C2 definition is clearly understood by the supported organization when supporting a non-military/national operation;

d. **Advance Party**. Advance party personnel need to have a comprehensive overview of their unit's mission, the CO's intent, capabilities, and requirements prior to deployment. Advanced party personnel must interface with the gaining commander, the unit being replaced, and the local population. Advance party personnel should be carefully selected by the commander keeping in mind the nature of the operation. Deploying to another country with an undeveloped logistics base may require the advance party to be heavily logistics weighted and contain translators, while other missions within Canada (i.e. counter-drug operations) can have an advance party weighted with operational personnel. Whichever the commander chooses, the advance party must receive guidance from the commander prior to deployment, and must keep the commander informed as to their actions and the current situation in the area of operations;

e. **Split Based Logistics Operations**. The squadron often deploys on an operation with a portion of the unit and into a theatre that has an immature logistics base. Often, logistics operations are conducted in theatre and from the unit's home location. This is termed split based logistics operations. The squadron/detachment commander who deploys on an operation that is conducting split based operations must consider the type of support that must be provided from the home unit. Special attention must be made to communications between the theatre of operations and the home unit and to the transportation means available to provide a timely flow of logistics to the deployed unit;

f. **Deployment**. OOTW deployments deserve special consideration because many times the squadron, or elements of the squadron, deploys alone and not with the parent organization. The Sqn CO must ensure that the deploying unit is fully supported during the preparation and execution phases of the deployment. Special emphasis for deployment should be placed on the following areas:

(1) **Early Involvement of Movement Control Personnel**. COs must coordinate early with the organizations providing movement control. Early coordination ensures that air, rail or ship operations are conducted smoothly,

(2) **Packing Lists**. Units need to identify a packing list and adhere to it. Transport and shipping containers will be based upon the packing lists submitted by the units. Careful attention needs to be placed on developing load plans that make the best use of the space available in the containers provided,

(3) **Liaison**. OOTW operations often require units to do missions they are not routinely trained to do. Liaison officers must be selected and deployed early to critical locations to provide the commander with information and to assist the unit in conducting a smooth deployment. Critical locations requiring liaison officers include transportation nodes, adjacent, supporting and supported units and higher headquarters, and

(4) **Loading Teams**. COs and Det Comds must anticipate the need for teams to monitor the loading of equipment on to and off of ships or planes, designate them early, and properly train them prior to mission execution;

g. **Logistics**. During OOTW, logistics is a critical element. The logistics base may be well developed or may be non-existent. COs and Det Comds must determine the logistics available to support the mission. There must be a priority for logistics dependent on the class of supplies. The following classes must be considered in priority:

(1) **POL**. Host nation or supported agency POL may or may not be available to supporting helicopters. Advance party operations must include determining availability of fuel in the area of operation. The advance party may have to establish contracts with local contractors or host nation agencies to provide fuel for aviation tankers or provide fuel from their own sources. If fuel is not available in the AO then coordination with the higher headquarters for fuel resupply is needed,

(2) **Ammunition**. Consideration must be given as to how the squadron obtains ammunition for door guns. Ammunition requirements are based on an analysis of the threat. Advance parties should coordinate with the higher headquarters to establish ammunition accounts and to determine the procedures for ammunition requisition and resupply,

(3) **Repair Parts**. Repair parts accounts must be established with the higher headquarters as soon as possible. The advance party should make all necessary arrangements for repair parts ordering before the unit arrives, including aircraft parts method of delivery. For an

operation without an established system for ordering repair parts, the unit should arrange for alternate methods of receiving these items, and

(4) **Food and Water**. Food and water must set up, prior to the arrival of the unit, by the advance party. Food could be provided through contracts or through the national logistics element. It is normally preferred to use contracts and local procurement to minimize the logistics tail, but in some cases the resources will have to be brought into theatre and food imported,

h. **Force Protection**. Force protection is just as essential in many OOTW operations as it would be in a warfighting situation. The siting of the aviation assembly area should take the threat into account and make maximum advantage of collocating with other units that could assist in providing security. If that is not possible or the threat indicates the need for additional security elements that cannot be provided internally, then extra security assets must be requested. Coordination for any external security force should be accomplished prior to deployment to the area of operations, if needed. The protection threat in OOTW can range from deliberate infiltration or damage to theft for criminal reasons to theft for life-sustaining reasons. The protection measures must be designed in line with the threat and the ROEs. It must always be remembered that physical protection, such as fences, berms, watchtowers, lighting and the like, will help to reduce manpower requirements. Military police and engineers should be consulted to assist in designing appropriate physical security measures. At the same time, the Sqn IO must maintain liaison with the military police concerning the threat;

i. **NBC Protection**. Normally NBC defence is not a high priority on OOTW, but that could easily change depending on the belligerents. The squadron must be prepared to protect its individuals at all times against asymmetric attacks using weaponized biological or chemical agents, toxic industrial chemicals or low level radiation caused by release other than attack. A detailed threat analysis is required for virtually any theatre and additional protective equipment may be required;

j. **Military Police**. The need for Military Police should be considered, depending on the mission. If large numbers of civilian infiltrators and thieves are expected then it may be better to have a military police detachment dealing with detained personnel and coordinating handover to the local police or a theatre civilian police (CIVPOL) organization. The MP would provide expert advice to the squadron commander;

k. **Rules of Engagement** (ROEs). ROEs are designed to control the application of force. These rules stipulate under what conditions troops can use force. The ROEs are prepared and issued at the theatre, JTF, or national level. The aviation unit commander must clearly understand the ROEs and ensure that all the personnel in the unit understand them. All personnel should be briefed on the current ROEs in effect prior to executing a specific mission; however, military personnel are always entitled to use force in self defence or in designated circumstances to protect others from death or serious bodily harm; and

l. **Host Nation Considerations**. Civil and military laws, airspace procedures, radio frequency usage, ground convoy clearances, flight restrictions, customs, passports, UN or NATO ID cards, and host nation contracting are all factors that the CO must consider prior executing OOTW in another country. A Status of Forces Agreement (SOFA) will normally be signed before the Canadian elements arrive in theatre and it will cover many of the above noted points. Airspace and flight restrictions may or may not be included. The CO must adapt to local procedures in order to accomplish the tasked mission.

OOTW MISSIONS

4. Helicopters can expect to conduct many different types of missions in OOTW. These missions can be conducted IAW the planning considerations listed in other chapters of this publication. The uniqueness of each operation makes it impossible to list all of the missions that tactical helicopters are tasked to accomplish, but the following is a list of missions that can be expected:

a. **Show of Force**. This mission is carried out to demonstrate resolve in which a force is deployed to defuse a volatile situation that may be detrimental to the interests of peace and security. It may take or the simple presence of a helicopter over the area, observing the situation. During OP KINETIC in Kosovo, a nightly show of force was conducted using the nite sun. Flying at 200 to 1,000 ft AGL, helicopters made their presence known by illuminating the night sky, over and around the environs of Pristina;

b. **Non-combatant Evacuation Operations**. These missions relocate civilian non-combatants from areas where they may be threatened. Personnel evacuation may be conducted in a peaceful environment or during war;

c. **Counter-Terrorist Operations**. These operations are conducted by specially trained RCMP personnel and tactical helicopter aircrew, formed as Joint Task Force (JTF) 2;

d. **Counter-Drug Operations**. Military efforts towards counter-drug support complement, rather than replace, the efforts of other government agencies, in particular the Solicitor General. Tactical helicopter support to these missions includes reconnaissance and air movement of counter-drug personnel. These operations are usually short notice and require SOPs that are written in concert with the counter-drug organization being supported (either provincial police or the RCMP);

e. **Humanitarian Assistance**. Whether in a domestic situation or during a PSO, providing humanitarian assistance to those in need is a routine and an important mission. Assistance missions include air movement of food, water, and other critical supplies; and air movement of personnel, to include medical personnel who provide essential care to the local population;

f. **Disaster Relief**. These operations may occur in Canada or abroad. Helicopters may be called upon to assist the civilian population in the event of natural disasters (hurricanes, earthquakes, fires, floods). Missions during these operations range from air movement of supplies and personnel to fire bucket missions. These operations tend to be complex and stressful for both the planners and the operators. The effects of the civilian population, the stress of large scale destruction and the usual lack of basic service support facilities all add to increase the complexity. This destruction also places demands on the unit by forcing personnel to operate in the most austere conditions;

g. **Search And Rescue (SAR)**. In most countries, peacetime SAR is a function conducted by non-military organizations. In Canada, SAR missions are conducted primarily by the specially trained aircrew and rescue personnel on SAR units. Secondary SAR is carried out by tac hel units when primary SAR resources either are not available or when distance and reaction time dictates the use of closer tac hel resources; and

h. **Airlift**. Helicopters conduct airlift during all types of operations. During OOTW, units can expect to be tasked to move troops, supplies, equipment, diplomats, allied forces, and media.

PEACE SUPPORT OPERATIONS (PSO)

5. PSO covers a wide range of activities that are normally conducted under the auspices of the UN, with a view to preventing conflict or mitigating their effects on the affected populations. Units participating in these operations work in concert with a variety of organizations and formations including foreign military and Non Government Organizations (NGOs) such as international civilian agencies, international organizations and private organizations. Peace Support Operations include:

a. peacekeeping;

b. peacemaking;

c. peace enforcement;

d. peace building;

e. conflict prevention; and

f. humanitarian operations.

6. **PSO Missions**. Due to the many organizations that will want to use the limited and valuable aviation resources it is imperative that strict, unambiguous command and control direction and priorities be given. Some aviation missions, which support PSO, include:

a. transporting personnel;

b. providing humanitarian aid;

c. command and liaison;

d. reconnaissance;

e. communications assistance;

f. security; and

g. show of force.

DOMESTIC OPERATIONS

7. **General**. This section is concerned only with domestic operations and is therefore directed towards missions in support of a government under specific legislation. Although domestic operations are only one aspect of aid and assistance rendered to the government and the public, they are perhaps the most complicated and have a wide application to other situations. Domestic operations include:

a. aid to the civil power;

b. armed assistance to other federal government departments;

c. armed assistance to the correctional services of Canada; and

d. protection of defence establishments and vital points.

8. In Canada armed assistance is based on several concepts which form an integral part of our legal system. Possibly the most fundamental concept is that civil authority is always supreme and cannot be usurped by the military. Accordingly, government domestic policy is to use the CF as a force of last resort. Situations in which troops could be employed in domestic operations and which could overlap are:

a. **Assistance in the Maintenance of Order**. This situation envisages a timely requisition of the military by civil authorities to augment police forces when they are overwhelmed by the magnitude of the disturbances. This type of operation could include a show of force to demonstrate the determination of the civil authority to maintain order, but will normally mean augmentation, assistance and relief of police forces to allow them to carry out their job; and

b. **Assistance in the Restoration of Order**. This function may be extensions of the previous one or the result of a sudden increase in violence not anticipated by the civil authorities. This is an operation that is normally carried out as a last resort, when all police capabilities are exhausted. It requires the employment of sufficient forces, including the necessary reserves, to restore the situation to the point where police forces can resume their normal responsibilities.

9. A domestic operation may flow from another type of commitment in progress (i.e. a flood situation may lead to looting and a call for aid from a government). It must be remembered, however, that the governing legislation is quite different when forces change from assisting in a civil emergency to conducting domestic operations. Domestic operations involve the provision of armed assistance pursuant to an appropriate request to assist the civil authorities in the enforcement of the laws of Canada. These operations invariably involve violence or the threat of violence.

DOMESTIC OPERATIONS MISSIONS

10. Helicopters tasked to support domestic operations can accomplish the following missions:

a. **Combat or Logistic Airlift**. The same techniques are employed in the airlifting of personnel in domestic operation as are employed for normal combat operations. These forces may vary from a team of civilian technicians to a mixed response force of police and military personnel;

b. **Reconnaissance and Tactical Security**. The same reconnaissance and tactical security concepts apply in domestic operations as in normal tactical operations. Aircrew must, however, pay special attention to the recognition of characteristics that indicate crowd congregation, dispersal, etc as well as to suitable avenues for approach of troops to the scene and for dispersal of civilians from the area. Helicopters may be used for curfew control, surveillance to locate snipers, conduct of searches for caches of rock, bottles etc, or for traffic observation and control;

c. **Airborne Command Post, Radio Relay and Liaison**. Helicopters can be used for the rapid movement of civil authorities to areas where problems threaten to develop and can allow on-site assessments from the air and issuance of instructions. Tactical helicopters may be used for radio relay or transport of liaison personnel in areas where periodic disturbances to communications may occur;

d. **Airborne Public Announcements**. The helicopter is a useful vehicle for disseminating information. It can be used to drop leaflets or the loud hailer may be used to transmit instructions and announcements;

e. **Airborne Illumination Systems**. Use of the nite sun or other illumination devices may be used extensively in support of domestic operations. Tasks may include crowd dispersal, search operations and general surveillance operations;

f. **Airborne Escorts**. Helicopters can be used to provide surveillance prior to and during movement of VIPs and troops, as well as being used as armed escorts; and

g. **Aeromedical Evacuation** (CASEVAC/ MEDEVAC). Helicopters can provide a platform for the rapid transport of casualties or medical patients.

CHAPTER 14

OPERATIONS IN SPECIFIC ENVIRONMENTS

INTRODUCTION

1. The full range of tasks common to tactical aviation is normally applicable to all operations and specific environments demand special attention and training to properly conduct operations. A clear understanding of tactical aviation's capabilities and limitation and the effects of various environments are necessary if optimum results are to be achieved. Operations in an NBC environment, although part of operations in specific environments, is detailed separately in Chapter 15.

NIGHT AND REDUCED VISIBILITY OPERATIONS

2. Reduced visibility can be caused by fog, precipitation, dust or smoke. Forces may deliberately conduct operations in such conditions in order to achieve surprise, create confusion, maintain momentum, enhance survivability or to respond to enemy action. Operations under these conditions give friendly forces a tactical and psychological advantage over the enemy and therefore often prove successful where clear/daylight operations prove impractical.

3. Reduction of visibility has the following adverse effects on operations:

   a. increased physical and mental stress on aircrew, which erodes combat effectiveness through increased apprehension and fatigue;

   b. engagement ranges of weapons are reduced and muzzle flash may reveal weapon locations;

   c. the recognition, identification and location of enemy forces and targets along with objectives and landing zones will generally occur at much shorter ranges;

   d. navigation is more difficult and the speed of movement is reduced;

   e. the presence of snow can create conditions that make the landing site unusable due to recirculating snow. This detrimental effect to visibility is magnified during night operations; and

   f. many typical battlefield tasks require additional time to complete as detailed planning, briefings and rehearsals become critical.

4. The ability to perform tasks at night has been eased through the use of NVGs and HUDs while those tasks conducted in low visibility have been enhanced by precision navigation systems. This being said, a high degree of specialized training and proficiency along with proper planning and good leadership is required in order to maximize the level of success in support of night/reduced visibility operations.

NIGHT EFFECTS ON TACTICAL AVIATION OPERATIONS

5. During night operations, different visibility requirements are needed for each task. There are two aspects to these visibility requirements, one being pure manual flying and the other being observation/engagement ranges. For manual flying, which involves such things as terrain avoidance, navigation and formation flight, the visibility must be such that obstacles can be recognized early enough to avoid them. The tactical visibility required for recognizing, identifying and engaging a target is greater than the visibility required for manual flying. Observation ranges that are as great as possible are required so helicopters will remain outside the range of enemy fire.

6. Equipment has met the visibility requirements for both the manual flying and observation and engagement through NVGs and Electro-Optics (EO). These devices with their narrow field of view impact on situational awareness coordination of tasks within helicopter sections.

7. Visual navigation in conditions of reduced visibility is very difficult and requires crews to examine all routes. Routes must be chosen that use prominent and easily recognizable features for navigation as much as possible. They should also avoid excessive turns and manoeuvring. The use of GPS and Doppler plus moving map displays improves the accuracy of navigation, the visual aspects must not be overlooked in the planning and execution.

8. Positive and detailed plans must be used both at departure points and in landing zones (LZs). Aircrew must be thoroughly familiar with the planned control procedures and proposed routes. In selecting LZs, greater stress must be placed on the factors that ensure safe landings, those being larger LZs than in day/good visibility, easily recognizable, and the approach must avoid excessive manoeuvring on final.

9. Planning techniques, though detailed for night operations, are similar to those for day operations. Plans must be kept simple. Day reconnaissance must be performed if tactical conditions permit. In addition, night reconnaissance should also be conducted. Full scale rehearsals by both the ground forces and tactical aviation should be carried out. Up to date intelligence, both friendly and enemy must be provided.

10. NVGs and EOs have greatly improved the ability of aircrew to operate at night. Flying with these devices, however, is a high risk operation and they do not provide the same operating conditions as daylight. The limitations caused by low illumination, time of day and moon angle along with terrain conditions and surface debris must be understood by the supported commander to avoid any misunderstanding aviation's capabilities.

11. Two critical aspects result from continuous operations. The first is fatigue. It is an important limitation for any unit performing continuous operations. Although tactical aviation units are capable of meeting surge periods of intense activity, continuous flying at maximum rates quickly reduces the effectiveness of the tactical aviation unit. Sound personnel planning and definite limits governing work and rest periods for both aircrew and technicians are required to minimize the loss of personnel and material. The second aspect is maintenance. Where it used to be that night and poor weather allowed aircraft

repairs to be completed, that convenience is now greatly reduced. Continuous monitoring of unserviceabilities is needed and scheduled 'down time' allotted for by the commander. This must be forecast and passed on to higher and supported units.

URBAN OPERATIONS

12. **General**. Traditionally, urban warfare has been an infantry responsibility. The principal reason being that built up, urban areas are considered hostile ground for tanks and other combat vehicles. Fields of fire and observation are severely limited, defiles are the rule and the potential of ambush is ever present. These limitations have similar implications for the employment of tactical aviation. Enemy operating in an urban environment can easily be concealed in numerous locations and can effectively employ weapons at a very close range. The height of buildings adds a third dimension to the application of firepower and creates problems for both the attacker and the defender.

13. **Operational Tasks**. The principles of employment of tactical aviation resources are just as applicable in urban warfare as they are in other operations. The vulnerability of helicopters in an urban environment should be viewed as a limiting factor to their potential employment. However, like the tank, tactical helicopters possess unique capabilities that may be exploited in urban warfare, despite the inherent risks.

14. **Surveillance Support**. A helicopter's mobility, combined with significant technological advances in EO devices, makes it an obvious choice for surveillance. These capabilities, however, are not well suited to ferret out a carefully concealed enemy in a built-up, urban area. Instead, tactical aviation should be employed on flank security on the periphery of urban areas where the observation capabilities can be used to best advantage. As well, tactical helicopter resources are capable of assisting military police to control refugees and conduct route surveys outside of urban areas. In a high threat environment, the vulnerability of helicopters makes survey and photo missions of urban areas questionable tasks. However, this is not the case in a low threat environment such as Kosovo, where these missions were routinely flown both day and night.

15. **Fire Support**. Recce helicopters may be tasked to conduct air observation post (AOP) missions and forward air controller (FAC) missions. Armed helicopters are invaluable in providing the covering fire for the assault of cut-off forces and for providing fire onto targets. The vulnerability of these resources however, dictates that these tasks be carried out at maximum observation and engagement ranges.

16. **Mobility Support**. Tactical aviation resources enhance the mobility of the land forces. They may be used to rapidly move:

a. anti-armour teams and infantry into blocking or cut off positions;

b. OPs, demolition teams and patrols;

c. infantry troops onto roofs or larger buildings;

d. reserves forward;

e. casualties to medical facilities; and

f. combat supplies forward.

17. **Command and Control**. Restricted observation and the degradation of radio communications pose special problems to the land forces. Tactical helicopters are employed in command and liaison tasks and have the capability to establish radio-rebroadcast stations quickly.

18. **Planning**. Tactical aviation must be included in the early stages of urban warfare planning. Priorities for employment are established and effective coordination of control and identification measures.

19. **Selection of Landing Zones**. The following points must be considered when choosing an LZ:

a. the availability of LZs in an urban environment is quite limited. Finding sufficient numbers of adequate and safe LZs, free of trees, electrical wires and supporting poles, and loose garbage and war debris, presents a problem. The large majority of LZs are, of necessity, in city parks or recreation areas, which are not always free of hazards. Industrial areas and factory yards may be used if parking, loading or storage areas are large enough;

b. school buildings may be used as force headquarters, since they are generally fenced which eases the problems of security. Additionally, school grounds are normally large enough to establish a vehicle park and LZ adjacent to the headquarters and are usually relatively free of hazards to helicopter operations;

c. parks and recreation areas are usually surrounded by power poles, wires, etc. Confined areas, loose garbage, steep approach angles and the high density altitudes of summer present problems to helicopter operations. These hazards can be reduced by limiting the number of helicopters landing at an LZ at any given time. Ground marshallers can be used to secure the area, assist in crowd control and mark the landing areas; and

d. in urban areas, buildings interrupt airflow causing turbulence, unpredictable wind direction changes and calm air near the ground. In determining the suitability of an LZ, allowance must be made for abrupt variations in lift encountered under these conditions. As well, visibility is often affected by industrial pollution and smoke.

ARCTIC AND COLD WEATHER OPERATIONS

20. **General**. The effects of arctic winter conditions on operations also apply in other areas under conditions of extreme cold. In most northern areas there is a scarcity or a total absence of roads, railways, airfields and settlements. While some areas may be forested, much of the terrain is treeless. In winter, ground and waterways are frozen and snow covered, while in summer much of the terrain is bog. Days are long or continuous in summer, while nights are long in winter. Winter weather is unpredictable, changes

rapidly and is characterized by snow, extreme cold and high winds. In extreme cold, survival of a force may be a more difficult problem than the defeat of the enemy or the conduct of the operation. Limitations on movement restrict flexibility and increase maintenance requirements. This, combined with the long lines of communication, aggravates logistics problems.

21. Tactical aviation can be invaluable in arctic operations primarily because of its ability to overcome the difficulties of movement and resupply under these extreme conditions. Severe arctic conditions, however, also dictate major changes in normal operating procedures for tactical aviation forces.

22. Tactical aviation planning must include climatological data for the planned area of operations to establish the frequency of poor weather conditions. Units must become adept at operating in long arctic nights and conditions of reduced visibility caused by low cloud, whiteout, ice fog, arctic sea fog, sea smoke, radiation fog, advection fog, blowing snow or snow reflectivity. Additional time must be inserted into planning an operation in extreme cold due to the requirement for aircraft preheating and increase start time.

23. Tactical airfields, PZs and LZs require additional preparation to accept helicopter operations. This preparation includes packing snow on the airfields, PZs and LZs to reduce the effects of blowing snow during helicopter manoeuvring. Engineer advice should be sought to assist in such work, but it could be done manually if necessary.

24. Arctic temperature increases maintenance requirements. At the same time they limit personnel exposure time and may degrade maintenance efforts. Wind chill becomes very dangerous particularly in the area of rotorwash. Handling of metal objects also becomes hazardous as skin will freeze to metal surfaces very rapidly. To sustain flying operations, temporary shelters and covers with heaters are necessary to minimize maintenance requirements and to facilitate working on helicopters.

25. The arctic environment also creates difficulties for communications and navigation capabilities. Aurora Borealis and solar disturbances can disrupt high frequency sky wave radio communications for periods of times lasting hours to days and satellite coverage is complicated. Major errors in altimeter readings can be caused by the cold conditions. Compass errors due to the weak horizontal magnetic field component and the rapidly changing magnetic variation are also normal.

26. The lift capability of helicopters in cold weather is good because of the low density altitude, however, this capability may still be reduced by the requirement to carry extra equipment and survival gear for arctic operations.

27. Extreme cold results in low humidity, which causes static electricity to be generated more quickly and at higher voltages than in a less dry environment. This could be dangerous during external load or hoist operations and is critical during any refuelling operation.

MOUNTAIN OPERATIONS

28. **General**. Mountainous areas are characterized by terrain, which has marked differences in elevation, steep slopes, ridges and valleys. The nature of the terrain, combined with unstable and rapidly changing weather patterns, affects all operations. In mountain operations, control of the terrain, which permits movement, must be obtained in order to achieve success.

29. Mountains provide excellent terrain masking to protect helicopters and to help avoid radar and visual detection by the enemy. Helicopters offer the land commander a means to overcome movement restrictions imposed by mountainous terrain. Flying techniques and operations, however, must be adapted to suit the peculiarities of these regions. Aircrew training and exposure to mountainous terrain is necessary to minimize the psychological effects of disorientation, vertigo and apprehension associated with operations in this environment.

30. The factors of weather, limited choice of LZs, potentially increased turnaround times and poor communications must be considered when planning helicopter operations in mountainous areas.

31. One important weather factor is air density. Increases in altitude and/or temperature decrease the air density and thereby the lift capability of helicopters. When airlift operations are being planned this factor must be considered. Winds are also an important factor. Increased wind speeds are found at high altitudes and changes in speed and direction may be frequent. Unpredictable air currents form around surface irregularities and even moderate winds may create updrafts, downdrafts and turbulence severe enough to either complicate or preclude landings.

32. Pressure changes may be erratic in mountainous regions and altimeter errors are common. In addition, subzero temperatures may complicate operations and maintenance. Clouds form easily in these areas and may reduce visibility and produce icing conditions. Glare from snow surfaces can interfere with depth perception and cause difficulties in assessing landing areas. A fresh snowfall, combined with low ceilings can cause "white out" conditions.

33. The very nature of the terrain in mountainous areas limits the number of suitable LZs. Generally there are fewer LZs and when available, they may require more preparation than on normal terrain. The enemy can also be expected to target likely LZs. Therefore they must be secured prior to usage. The effects of altitude and wind may also reduce the availability of suitable landing areas. Winds, visibility or density altitude may change rapidly, causing changes in landing direction or the need to use an alternate site. Snow covered areas that appear suitable for landing may hide dangerous obstacles beneath their surface. Special attention must be given to the selection and preparation of landing areas during the preparation of operational plans. If necessary, troops may have to be delivered by hoisting or rappelling.

34. The rugged terrain also limits the availability of locations from which squadrons can conduct operations. When selecting a site the factors of defensibility, dispersal, communications, and transport may come into conflict and weighed against the mission.

JUNGLE OPERATIONS

35. Jungles are found mainly in the tropics and are characterized by heavy rainfall, high temperatures and humidity. They may be evergreen rain forests, deciduous forests, swamps or grasslands. The terrain in jungles is often rugged, containing swamps, deep valleys and steep ridges. Streams and rivers are plentiful and the soil is soft.

36. The use of helicopters minimizes the problems of ground movement, navigation and communication for land forces in the jungle environment. Safe and successful tactical aviation operations in jungles require intensive aircrew and ground crew indoctrination training. Maintenance requirements are increased in a jungle environment causing erosion. High temperatures cause lubricants to break down and seals and gaskets to distort resulting in leakage problems. COs must plan for increased maintenance support requirements and must endeavor to protect equipment from these environmental effects. Further aircraft maintenance is required, i.e. water washes, preservation, etc.

37. Hot, tropical air decreases air density and as a result, helicopters are not able to lift the same loads that they normally could in a more temperate area.

38. Navigation, because of the general lack of readily identifiable landmarks, is difficult. Reliance on dead reckoning is often necessary. Flying in instrument meteorological conditions (IMC) is impractical because of the lack of radio navigation aids and the presence of thunderstorms in these climates.

39. Jungle weather is subject to rapid and often violent change. Thunderstorms produce strong winds, turbulence, heavy rain and poor visibility. Heavy mist is common in the early morning or following a rain. Storms are often preceded by squall lines then followed immediately by low cloud layers. All of these can temporarily disrupt tactical aviation operations, as helicopters require securing or missions delayed. These effects are compounded by the scarcity of weather reporting facilities.

40. Special care must be taken in the storage and transfer of aircraft fuel because of the accumulation of water due to condensation and subsequent fungus growth. This high humidity also means that corrosion becomes a problem for aircraft parts. Increased maintenance checks are required.

41. As in mountain operations, there is a scarcity of suitable landing sites in the jungle. In most instances jungle growth must be cleared. Often rappelling or hoisting of personnel is required to support combat operations.

DESERT OPERATIONS

42. Deserts are arid expanses of mountains, rocky plateaus or dunes. Ranges of barren hills and low mountains with deep, steep ravines characterize mountain deserts. The ranges are separated by dry salt flats or salt marshes. Rocky plateau deserts have relatively slight relief separating extensive flat surfaces of solid or broken rock at or near the surface. Dune deserts are covered with sand or gravel, with dunes that may be relatively close together or separated by large areas of flat ground. Steep canyons often cut rocky plateau and dune deserts.

43. **Characteristics**. The principal characteristics of desert areas that affect combat operations, regardless of surface configuration, are the lack of water and vegetation, the extreme temperature variations and sandstorms.

44. **Protection**. Due to scant vegetation and the nature of the terrain, tactical aviation units are difficult to conceal in the desert. Therefore they are vulnerable to enemy activity and special attention to protection is required. Helicopters, vehicles and equipment must be widely dispersed, camouflaged and located well away from supported ground units. If possible, protective revetments, berms or dugouts should be constructed if there is the threat of attack. Engineer assistance should be sought for this work. Because of the lack of protective terrain, helicopters in flight are easily spotted, making successful evasive action very difficult. The good visibility allows weapons to be used to their maximum effective ranges.

45. **Environmental Effects**. These effects degrade both equipment and personnel performance. Extremely high daytime temperatures decrease lift capabilities. They also impose added stress on both aircrew and technicians thus limiting continuous operations. The absence of significant cloud cover produces bright glare conditions. Observation can be obscured by heat shimmer and mirages. High and violent winds are common and can affect both visibility and maintenance requirements.

46. **Maintenance**. Maintenance requirements are increased due to sand and dust causing erosion of windshields, rotor blades and engine parts. High temperatures cause lubricants to break down and seals and gaskets to distort resulting in leakage problems. COs must plan for increased maintenance support requirements and must endeavor to protect equipment from these environmental effects. Further aircraft maintenance will be required.

47. The lack of terrain features and poor reference points complicates navigation. The inaccuracy of maps, contour presentation and the nature of the constantly changing terrain make the use of electronic and visual navigation aids a necessity. Suitable landing sites may be difficult to select from the air particularly in areas of soft sand and hidden boulders.

48. Dry and sandy terrain inhibits radio wave propagation reducing radio ranges. In addition storms are frequently accompanied by intense electrical disturbances that limit the use of radio and navigational aids.

CHAPTER 15

OPERATIONS IN A NUCLEAR, BIOLOGICAL AND CHEMICAL ENVIRONMENT

GENERAL

1. Canada's position on NBC warfare is never to engage in offensive NBC operations. This is not true of some other nations. Several "rogue states" have not signed any agreements against the use of offensive NBC weapons, thus creating the possibility of having to conduct aviation operations in a NBC environment. Biological and Chemical warfare were real threats during the Gulf War.

2. This chapter serves as a planning guide by which aviation is employed in a nuclear, biological, and chemical environment. Helicopters may be the first to encounter NBC conditions in the battlespace. Aviation can expect to conduct all or part of their operations in an NBC environment. Tactics, techniques and procedures must be developed that not only detail the normal helicopter combat missions, but also how to conduct these missions in such an environment. All personnel must be trained and exercised while wearing their NBC individual protective equipment (IPE) to be able to operate effectively in NBC conditions.

3. **NBC Effects**. This chapter is not intended to list all the effects of NBC warfare, which can be found in other publications, such as the B-GG-005-004/AF-011, *CF Operations, NBC Defence*. It lists those NBC effects, which can affect helicopter operations and aircrew.

THREAT

4. The NBC threat can exist anywhere, including Third World countries that have an NBC capability, especially those with petrochemical industries. Some of these nations have developed and fielded a large inventory of defensive equipment and have well-trained chemical personnel. As part of their overall preparedness, they conduct extensive, realistic training. However, NBC warfare imposes the same constraints on personnel on both sides of a conflict.

NUCLEAR WARFARE

5. Threat nations have a wide range of systems that can deliver nuclear weapons. No area on the battlefield is free from the threat of a nuclear strike. They have stated priorities for nuclear strikes. They include the following, but there is not guarantee in the future that this list will be all inclusive, or attacked in this order of priority:

a. enemy nuclear delivery means, aircraft, field artillery, missiles, and rockets;

b. airfields;

c. division and higher level headquarters;

d. defensive positions;

e. reserves and troop concentrations;

f. supply installations, especially nuclear ammunition storage points; and

g. command, control, and communication (C^3) systems.

6. Aviation units are vulnerable to nuclear strikes and while they may not be directly targeted, they could be co-located with high asset targets that may be attacked by nuclear weapons.

7. An emerging nuclear threat is the hazard caused by Release Other Than Attack, especially Low Level Radiation (LLR). These radiation releases could result from deliberate attacks on installations such as nuclear power plants, or the deliberate release of nuclear material, such as the demolition of an x-ray machine. In other cases LLR could result from a nuclear source damaged by battle. The ability to monitor for LLR and to monitor exposure of personnel will become increasingly important in deployments.

THERMAL RADIATION EFFECTS

8. **General**. The energy released from a nuclear detonation interacts immediately with the surrounding air. Almost instantly, an intense light pulse is emitted. Also, the air is heated to thousands of degrees Celsius, vapourizing even the unreacted bomb material. The sphere of super-heated air is called the fireball and the heat and light are referred to as thermal radiation. Thermal radiation continues to be emitted from the detonation for several seconds to tens of seconds, depending on the yield of the weapon.

9. **Materiel Damage**. Thermal radiation is hazardous to ground support equipment and supplies as well as personnel. Fuel stored in fuel bladders is especially vulnerable. The black rubber in a fuel bladder absorbs thermal radiation and may become heated and hardened. The blast may also puncture or stress the fuel bladders, causing them to leak. Burning rubber, leaves, or grass might ignite the fuel, causing explosions and fires. Personnel (fuel handlers) at FARPs must protect the fuel bladders by burying them or covering them with tarpaulins.

10. **Light Effects**. Light mainly affects personnel. The effects of light on aircrew range from flash blindness to retinal burns.

a. **Flash blindness**.

(1) The retina may receive more visible light from a fireball than is needed for light perception but not enough to cause permanent damage. Visual pigments of the photoreceptors bleach out and vision is briefly impaired. This effect is called flash blindness. It is sometimes referred to as dazzle. Flash blindness is more of a hazard at night than during the day, because the pupil is larger and admits more light at night. How flash blindness affects military operations depends on the tasks of affected personnel. While the

temporary loss of vision may be hazardous to ground soldiers, it could be fatal for aircrew, and

(2) The severity of flash blindness is related directly to the yield of the weapon, distance between the fireball and personnel, and atmospheric conditions. Low visibility reduces the magnitude of the visible light pulse. In the daytime, a 1-kt weapon could cause flash blindness from a distance of 6 kms. At night, the same weapon would produce flash blindness from a distance of 51 kms, and

b. **Retinal burns**. An excessive amount of light focused on the retina can cause retinal burns. The intense light burns the photoreceptors and causes a blind spot. The damage is permanent, because photoreceptors cannot be replaced. The degree of incapacitation would vary. For example, a person looking directly at the explosion could suffer destruction of the fovea centralis and be considered functionally blind. Another person with a burn in the periphery of the retina might not be aware of the blind spot. Personnel facing a 1-kt detonation could receive retinal burns from as far away as 7 kms.

BLAST EFFECTS

11. The rapid expansion of the fireball creates a wave of compressed air. This is referred to as a shock wave or a blast wave. The blast wave causes damage by two kinds of pressure: dynamic pressure, referred to as winds, and static overpressure, referred to as overpressure. The compressed gases produced by a nuclear explosion expand outward in all directions from the point of detonation. This wave travels at about the speed of sound. Blast effects are broken down as follows:

a. **Dynamic Pressure**:

(1) **Wind velocity**. The wind velocity can range from a few kilometers per hour (kph) to hundreds of kph. The velocity depends on the yield of the weapon, height of the burst, and distance from the point of detonation. The wind velocity decreases with distance. For example, a 160 kph wind occurs about 10 kms from a 1 megaton (Mt) detonation, 6.5 kms from a 300 kt detonation, or 1.5 kms from a 5 kt detonation. However, when a nuclear burst first detonates, the observer is unable to predict the wind force because he does not know the yield of the weapon or the location of ground zero,

(2) **Drag forces**. The winds cause damage by drag forces. Drag forces cause buildings to collapse and vehicles to overturn. They create missiles from flying debris such as rocks, sticks, or glass fragments. They also hurl exposed personnel against structures and solid objects and blow down trees. For nuclear weapons, the

time from the initial blinding flash of light until the blast wave reaches the area can be several seconds or longer. For large yield weapons at great distances, the time can be longer than 30 seconds. Thus, personnel have some time to seek shelter before the blast wave hits,

(3) **Wind phases**. Winds have both a positive phase and a negative phase. During the positive phase, winds travel outward from the point of detonation. As the fireball rises, a slight vacuum is created. This causes the winds to reverse and blow back toward the detonation. The velocities of this reverse wind are mild compared to the positive phase. The reversal of the winds keeps missiles in the air longer and possibly causes more damage. The missiles may fall back to the ground and settle after the positive phase. They are then picked up again by the negative phase. Because of the turmoil, ground troops may not even notice the negative phase. Aircrew may notice it more because wind reversal creates more air instability for them to overcome, and

(4) **Aerodynamics**. The effects of high winds on helicopters have been studied in wind tunnels and in open-air testing. Nuclear blast winds have the same effects on aerodynamic surfaces and airframes as any other type of high wind. Nuclear weapons can produce enormous wind velocities, extreme turbulence, and wind shear. The winds persist longer than those produced by conventional munitions. Helicopters may experience sudden yaw, pitch, roll, and lift changes. Extreme effects can include blade flapping and bending, mast bumping, loss of tail rotor effectiveness, flameout, and airframe crushing. These effects dictate the need to land and shut down the helicopter whenever known blast effects are to occur, and

b. **Static Overpressure**:

(1) **Overpressure Force**. The compressed gases create a force that causes the ambient air pressure to increase. This is overpressure. A conventional high-explosive munition also has an overpressure effect; however, it is not as powerful and lasts only microseconds. The nuclear explosion creates overpressure that can be hundreds of times greater than the ambient air pressure. As with the winds, the overpressure decreases as the distance from the point of detonation increases,

(2) **Aircrew Injury**. Wind velocity and overpressure are interrelated. For example, the wind velocity is about 55 kph at one pound per square inch (psi) overpressure and about 255 kph at five psi. At overpressures of .5 psi and greater, windscreens begin to shatter and flying fragments can injure aircrews. At 55 kph, glass

fragments are a significant hazard to the eyes and the throat. At higher pressures, the wind velocity can cause casualties from fragments penetrating the flight suit and skin. Also, with the windscreen gone, external missiles may enter the cockpit and cause injuries. The best protection available to aircrew is receiving an early warning by radio. Aircrew can land in the lowest terrain possible and can then place the rear of the helicopter in the direction of the expected blast. This method increases the aircrew's survivability. The distance from the blast determines the degree of damage to the helicopter, and

(3) **Airframe Damage**.

(a) Airframes are vulnerable to overpressure effects. Glass, Plexiglass, safety Plexiglass, or safety glass, begins to shatter at .5 to 1 psi overpressure. At .5 to 2 psi, larger windows that face the point of detonation shatter first. As the overpressure increases (2 to 5 psi), all windows shatter. Overpressure may cause glass to implode initially, then the positive wind phase creates missiles of the glass fragments,

(b) Overpressure initially affects only the side facing the detonation. However, the blast wave envelops the helicopter within microseconds, exerting forces on the opposite side as well. The sequential occurrence creates buckling and twisting forces, resulting in skin wrinkling and internal frame stresses, and

(c) Light damage to the airframe, other than glass, begins to occur at 3 to 5 psi overpressure. On helicopters, the tail boom weakens and may undergo slight separation. Subsequent severe flight manoeuvres may result in tail boom failure. On all aircraft, the fuselage and internal frames undergo substantial stresses and skin panels rupture. Airframes components may fail at these pressures.

NUCLEAR RADIATION EFFECTS

12. Nuclear radiation consists of all types of ionizing electromagnetic and particulate radiation; specifically, alpha, beta, neutron, and gamma. Nuclear radiation travels outward in all directions from the detonation point. The effects of nuclear radiation are categorized as initial and residual, detailed as follows:

a. **Initial Effects**. The initial effects are those manifested within 60 seconds after detonation. They consist of all types of electromagnetic and particulate ionizing radiation. For small yields, the initial radiation causes numerous personnel casualties. However, a helicopter flown close enough to the nuclear detonation for the aircrew to receive incapacitating dosages would probably not survive the blast damage anyway. This initial radiation is a concern for aircrew on the ground, personnel in FARPs, and aviation units;

b. **Residual Effects**. The residual effects are those that remain hazardous after 60 seconds. The most important residual effects are fallout and induced radiation or neutron-induced gamma activity:

(1) **Fallout**. The fireball continues to grow after a nuclear detonation, stabilizing within several minutes. Because hot air rises, it also gains altitude as it grows. The rising and cooling of the fireball create an area of low pressure directly beneath the fireball. If the point of detonation is close to the earth's surface, then dirt and debris are drawn up into the fireball. Vapourized bomb material then mixes with the dirt and debris. The mixture of radiological dirt and debris, called fallout, begins to fall back to earth and may cover hundreds of kms as it travels downwind. Fallout can result in significant radiation dose-rate levels and communication blackouts from large quantities of dust and debris in the atmosphere. Large particles may also cause structural damage and foreign object damage to helicopters, and

(2) **Induced radiation or neutron-induced gamma activity**. Neutron radiation occurs only during the initial nuclear reaction. However, neutrons can cause other elements to become radioactive. The ground directly below the point of detonation will most likely become radioactive. This induced pattern, usually not exceeding 4 kms in diameter, presents a significant radiation hazard for ground personnel for 2 to 5 days after the burst, and

c. **Radiation Exposure and Sickness**. Aircrew exposed to radiation may exhibit certain symptoms. The onset of radiation symptoms, their severity, and their duration generally depend on the amount of radiation the individual receives and variables such as health, previous exposure, and injury. Before directing aircrew into areas of suspected or known radiation contamination, COs must evaluate how essential the mission is. Aircrew can use radiac meters and dosimeters in aircraft to measure radiation total dose and dose rates. COs can then evaluate the effects of aircrew exposure and anticipate aircrew ability to perform future missions. An individual exposed to radiation may have alternating periods of performance degradation, combat effectiveness, and combat ineffectiveness. For example, an undemanding task in the 500 to 800 rad range may cause an individual's performance to be degraded initially for up to two days, then the individual briefly regains combat effectiveness. Thereafter, the individual's performance is again degraded and deteriorates until combat ineffective occurs.

(1) **Radiation Exposure**. Radiation exposure considerations are much the same for aviation personnel as for ground personnel. However, the aviation commander has the more difficult job of determining when an aircrew becomes ineffective from radiation exposure, and

(2) **Radiation Sickness**. Aircrew must be alert to symptoms that impair their ability to fly. Supervisors should observe their personnel closely to detect behavior that may necessitate grounding them. Initial symptoms of radiation sickness, such as nausea, fatigue, and listlessness, may mimic those of other illnesses. Flight Surgeons should monitor radiation exposure and provide appropriate guidance to the CO.

ELECTROMAGNETIC PULSE EFFECTS

13. The electromagnetic pulse (EMP) effect is a wave of electromagnetic energy produced by a nuclear detonation when gamma rays make contact with the atmosphere. The wave occurs immediately after nuclear detonation and travels outward in all directions. EMP presents no significant biomedical hazard to humans. However, it can damage electronic components. Because EMP is a form of electromagnetic energy, it follows the path of least resistance into electrical equipment.

a. **Component and Aircraft Systems' Damage**.

(1) **Component Damage**. EMP can affect any electrical component. A sudden surge of EMP causes overvoltage, shorting out wiring and transistors. EMP can enter through the casing of radios and destroy them. It can destroy circuitry even with radios turned off and antennas disconnected. The severity of the damage depends greatly on component design. Testing continues to determine the extent to which a system can be disabled by EMP damage. Not every electrical component is destroyed by EMP. Some components may only be temporarily disabled, and

(2) **Aircraft Systems' Damage**. Aircrew should know which aircraft electrical systems are critical and how failure of those systems affects the flight. For example, some aircraft instruments may be disabled, radios or navigational aids may not work, or visual or targeting aids may fail; and

b. **Communication Net Impairment**. EMP affects communication nets. Commanders must be prepared for EMP degradation by training with backup units and alternate means of communications.

BIOLOGICAL WARFARE

14. Biological warfare is the intentional use of biological agents to cause death or disease in people, animals, or plants. Examples of these living organisms, called germs (from which comes the term "Germ Warfare"), are viruses, bacteria, and fungi. Germs can be dispersed over the battlefield by artillery, rockets, aircraft, sprays, vectors, or covert operations. The possibility of biological warfare exists even though treaties prohibit it. A biological agent is any living organism, toxin, or other agents of biological origin that can incapacitate, seriously injure, or kill personnel. The threat considers toxins to be chemical agents. The agents covered by biological treaties are bacteriological agents.

15. **Effects**. Mild exposures to biological agents can severely degrade performance. Many of the classical diseases have delayed effects, whereas the effects of most toxins are immediate. Toxins can create area contamination as well as downwind and vertical vapor hazards. Medical personnel, especially flight surgeons, must constantly monitor aviation personnel to detect unusual symptoms that may indicate exposure to a biological agent.

16. **Protection**. Commanders must be prepared to protect against biological agents used by an enemy. Immunization is available for many of these agents to help protect personnel against these diseases. Biological agent detectors are currently under development and should be considered for deployment around static installations such as helicopter assembly areas. In all cases personnel should be aware of the potential hazards and maintain high levels of hygiene and sanitation to avoid spreading some of the agents. Equipment, stores and supplies should be covered whenever possible to prevent contamination. The squadron NBC officer must be trained on counter measures and kept up to date on the threat in the AO.

CHEMICAL WARFARE

17. Most countries classify chemical agents in six major types: nerve, blood, blister, choking, psychochemical, and irritant. In a nuclear war, chemicals may be used to complement nuclear weapons. Normally, chemicals would be employed after a nuclear strike when protective equipment has been damaged and personnel are physiologically weak. A combination of agents can be used to complicate medical treatment and compound the effects of individual chemical agents. Chemicals do not require pinpoint targeting because of the potential for contaminating a wide area downwind of the attack.

18. **Nerve Agents**.

a. **Effects**. Even extremely low dosages of nerve agents can disable personnel. The dosages can degrade the ability of aircrew to operate helicopters and ground personnel to support aviation operations. Nerve agents severely disable personnel in any occupation requiring dexterity and high mental function. Nerve agent exposure is cumulative, so repeated exposure to low dosages result in a cumulative increase in personnel disabilities;

b. **Types**. Nerve agents are lethal in either vapour or liquid form and they can be employed as nonpersistent or persistent agents. They cause casualties through any portal of entry: respiratory tract, skin, eyes, or mouth. (They usually are ingested by mouth with contaminated food or water.) After aircrew have flown into a vapour cloud, within two breaths, they can inhale sufficient agents to cause initial convulsive movements of extremities within 30 seconds. Progressively, one collapses and become unconscious within one minute and experience flaccid paralysis, respiratory failure, and die within two to three minutes. When agents are ingested in contaminated food or water, symptoms may vary or be delayed;

c. **Miosis**. Low dosages of a nerve agent also causes miosis. Symptoms of miosis are pinpointed pupils, blurred vision, and eye pain. The victim cannot adapt to night vision because the dark adaptation of the rods in the peripheral portion of the retina is restricted. Miosis may last for hours or several days. Full recovery may not occur for weeks. Symptoms of miosis may be evident in the absence of any other nerve agent symptom.

(1) The absence of miosis does not exclude nerve agent poisoning, especially in cases of ingestion or skin exposure. Miosis may occur almost immediately after exposure, or it can be delayed 30 minutes or longer after a mild exposure. Recovery time depends on individual reactions. Near vision, night adaptation, far vision, and accommodation will slowly return to normal in varying degrees,

(2) During bright daylight, the only effect of miosis on vision may be dimness of vision. During periods of low visibility and at night, dusk, and dawn, the impact of miosis may be significant. Aircrew may not be able to fly, and

(3) The impact of miosis on personnel is not limited to aircrews. Ground support personnel in air traffic services and AD units and C^2 facilities are also affected by miosis. This degradation of support capability affects all aviation missions; and

d. **Antidotes**. The CF nerve agent antidote is an atropine autoinjector.

(1) **Effect**. The anti-nerve agent injection keeps the victim alive. Nerve agents are powerful and require powerful antidotes to counter their effects. Antidotes must not be used on a person unless actually exposed to a nerve agent. However, some personnel may panic during the initial encounter of chemical warfare on the battlefield. Many symptoms of other chemical agents, especially toxins, overlap nerve agent symptoms. Therefore, personnel may misdiagnose the symptoms, and

(2) The effects of atropine on aircrew are being studied. Serious side effects may impact on a person's fitness for flying duty. When an adequate dose of atropine is injected for lifesaving measures, dryness of the mouth is a side effect. This side effect also occurs even if no agent is present in the body and atropine is injected. Three autoinjections may cause hallucinations. One autoinjection probably will not seriously degrade an aircrew's ability to function. Some side effects of atropine are denial of illness, loss of insight, and loss of consciousness. Other symptoms include perceptual difficulty, judgment and memory impairment, confusion, short attention span, slurred speech, and restlessness. These reactions are also similar to the symptoms experienced from incapacitating agents such as psychochemicals, cocaine, and cannabis.

19. **Protection**. Even a mild exposure to agents may be fatal to aircrew, because aircraft control may be lost. Also, the long-term, systemic effects of agents and treatments can degrade performance, causing aircrews to be grounded. Flight Surgeons must carefully monitor aircrew for symptoms of exposure to agents and advise the commander. When personnel are not wearing NBC IPE and exposure to agents is suspected, they may be temporarily grounded and observed for symptoms. However, in the absence of actual symptoms, the tactical situation may preclude preventive grounding.

NBC DEFENCE

20. **Contamination Avoidance**. Contamination avoidance, the first fundamental of NBC defence, means taking the appropriate action to reduce all NBC hazards. The term avoidance does not necessarily mean aborting a mission or cancelling an operation just because contamination is present. Personnel go into hazardous areas only when necessary. Brigades use the NBC warning and reporting system in addition to reconnaissance, monitoring, and survey to help locate contaminated areas.

a. **Contamination Transfer**.

(1) All personnel should understand how they and their equipment become contaminated and how contamination spreads to other personnel and equipment. Contamination refers to the deposit or absorption of hazards. A unit may be the target of a threat NBC attack, or the downwind hazard from a contaminated unit may cause agents to drift into another unit's area. Also, a unit may move or fly into contaminated areas from which helicopters can transport contaminated equipment or personnel; and

(2) Helicopters can transfer contamination from the ground into the helicopter or vice versa. This transfer occurs when the rotor wash picks up dust, sand, leaves, or other contaminated debris. The debris or liquid droplets are then scattered throughout the helicopter. Some agents are like a fine spray. Although suspended

in the air, they can settle on personnel or equipment like dew. Helicopter vibrations increase the settling of agents in remote areas of the airframe such as panel points or rivets. Also, the type of paint on the helicopter affects contamination. Alkyd based paints absorb the agents like sponges. Newer paints are being developed, such as agent-resistant coatings, that resist chemical agent absorption; and

b. **Limiting the Spread of Contaminants**:

(1) When operating in a contaminated area, all personnel must take steps to limit further exposure to the hazard. Aviation assets can often find clear routes through a contaminated area so that exposure to NBC hazards is reduced. If movement is not possible, the unit must employ individual and collective protection measures to prevent casualties. Almost any shelter that protects from the weather also protects somewhat from fallout and liquid chemical agents,

(2) Personnel can cover ground equipment in the FARP and rear areas to avoid direct contact with contaminants and then discard the covers to operate the equipment. Examples of covers are tarpaulins, plastic bags, and cardboard boxes. If possible, personnel should keep equipment in original containers; for example, ammunition cans. Personnel can also place equipment in covered vehicles or shelters and operate it from these locations. These measures decrease the amount of contamination transfer and may reduce the need for decontamination,

(3) A plastic curtain can be fastened with tape between the cabin area and the cockpit when carrying contaminated personnel or casualties to limit contamination transfer,

(4) Areas that provide natural cover should be used for sqn locations. Aircrew can park helicopters near buildings in urban areas for limited protection. If assault or medium helicopter units pick up or deliver troops in contaminated LZs, aircrew must ensure that doors, vents, and windows are closed to reduce contamination transfer, and

(5) Placing a cover on the floor of the cargo area also helps reduce the amount of contamination transfer to the interior of the helicopter. Plastic covers, tarpaulins, paper, cardboard, clothing, or even leaves can aid in limiting contamination transfer. However, covers must be secured so that they do not present a FOD hazard. When flying out of contaminated areas and into clean areas, aircrew should open all doors and windows. About 20 minutes of flight

rids the helicopter of accumulated vapour hazards, but liquid contaminants remain a hazard, and

c. **Avoiding Contaminants**. The best way that aircrew can keep their helicopter free from contamination is to avoid flying into contaminated areas. However, aircrew have no onboard means of determining which areas are contaminated. Therefore, they may be unable to avoid contaminated areas. Contamination avoidance also applies to ground support locations such as FARPs.

21. **Protective Measures**. Protection, the second NBC defence fundamental, is both individual and collective. When the unit cannot avoid contamination, or is under direct attack, personnel must take appropriate actions to survive. Specific actions are taken before, during, and after an attack. To sustain operations in an NBC environment, unit personnel must understand and practice individual and collective protection. Individual protection involves those measures everyone must make to survive. These include acting immediately upon observing a nuclear detonation, donning NBC Individual Protective Equipment (IPE), and wearing other protective equipment and devices. Collective protection provides a contamination-free working environment for selected personnel and precludes the continuous wear of IPE.

a. **Individual Protective Equipment**:

(1) **General**. Personnel are issued IPE to protect themselves from a chemical or biological hazard. IPE consists of the CB protective mask, hood, overgarment, overboots, protective gloves, individual decontamination kit, detection equipment, and antidotes,

(2) **NBC Protective Flight Suits**. All aircrew are issued NBC flight suits when an NBC threat exists. These suits are charcoal impregnated to protect against chemical agents,

(3) **Aviation Life Support Equipment**. All aircrew will be issued an aircrew NBC suit, aircrew chemical protective gloves and chemical protective overshoes in the correct sizes. Personnel should ensure that they have the correct glove size so their tactile sensitivity is not degraded,

(4) **AC4 Mask**. The aircrew AC4 NBC mask is a derivative of the CF NBC mask, the C4. It has been modified with a different suspension system and a microphone. The AC4 mask and blower assembly provides a positive over pressure during the breathing cycle. The AC4 hood provides chemical protection and a comfortable fit under the helmet, and

(5) **Overboots**. Overboots make pedal control more difficult, but this can be alleviated through training, and

b. **Mission Oriented Protective Posture (MOPP)**. Commanders select a level of protection based on the chemical or biological threat, temperature, work rate, and mission. The levels of protection are MOPP zero through MOPP 4. Aircrew fly in NBC IPE at one MOPP level higher than the current army threat level. Some of the reasons for this are as follows:

(1) personnel cannot detect agents with their senses,

(2) agent clouds travel vertically as well as horizontally,

(3) aircrew exposed to CB agents may be grounded for an extended period,

(4) helicopters are not equipped with advanced warning or detection devices,

(5) it is not practical to don CB equipment, including the mask, during flight,

(6) aircrew exposed to sublethal dosages of CB agents during flight may lose control of the helicopter and crash, and

(7) rotor wash may transfer droplets or contaminated dust inside the cockpit, creating a skin contact hazard.

HELICOPTER DECONTAMINATION

22. **General**. There are three levels of decontamination: immediate, operational and thorough. Decontamination procedures can be found in B-GA-442-001/FP-001, *Tactical Aviation Tactics, Techniques and Procedures*, Chapter 13.

COLLECTIVE PROTECTION

23. Collective protection (COLPRO) is the process whereby protection from the hazards of NBC contamination is provided collectively to a group of individuals, thereby freeing them from the requirement to wear IPE. COLPRO facilities are required to permit certain key facilities and organizations to perform their jobs; individuals who cannot normally carry out their responsibilities if wearing the IPE, or individuals who require relief from extended wearing of the IPE. There are three categories of COLPRO:

a. **Fixed**. These are fixed, static locations and normally consist of hardened shelters and HQ buildings;

b. **Mobile**. Mobile COLPRO systems usually consist of vehicle or ship installed/mounted installations; and

c. **Transportable**. Transportable COLPRO refers to systems that are usually based on tentage-like equipment that is readily transportable by airlift They can also be a liner system that can be erected using a building or other structure such as a sea container for its support.

24. COLPRO generally provides a Toxic Free Area (TFA) for working or relaxation through a combination of NBC filtration and an over pressurization system within the facility itself. COLPRO is provided in two configurations:

a. **Basic COLPRO**. Basic COLPRO consists of a TFA. This type provides the toxic free environment; however, it does not permit any openings to be breached; therefore, no entry or exit can take place when contamination is present; and

b. **COLPRO with a Contamination Control Area**. This COLPRO incorporates a Contamination Control Area (CCA) along with the TFA. The CCA allows for entry and exit when contamination is present. The CCA consists of a Liquid Hazard Area (LHA), a vapour hazard area (VHA) and an airlock that connects it to the TFA. This system ensures the integrity of the TFA by allowing potentially contaminated air in the airlock to be purged by clean air from the TFA out through the VHA and LHA prior to someone entering the TFA.

25. As of the publication date, the CF has not purchased COLPRO, but is intending to. As well, other coalition countries do have COLPRO equipment. Design criteria for transportable COLPRO is provided in STANAG 4192. The size of the various areas of the COLPRO vary depending on the size of the structure within which it is erected. As a general guide, the following diagram (Figure 15-1) provides a standard layout and shows the airflow required:

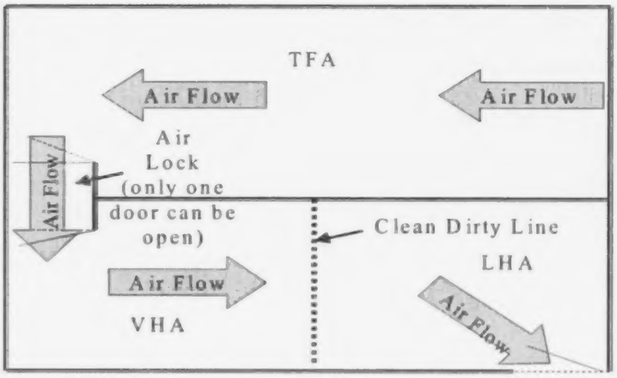

Figure 15-1. Example of a COLPRO Layout

CHAPTER 16

COUNTER-MOBILITY OPERATIONS

GENERAL

1. The main method for aviation to stop or affect the mobility of vehicles on the ground is through the deployment of scatterable mines. Canadian policy is not to use anti-personnel mines.

AERIAL MINE LAYING

2. Aerial delivered anti-tank mines can support tactical operations by emplacing tactical minefields, reinforcing existing obstacles, closing lanes, gaps, and defiles protecting flanks and denying the enemy AD sites. An aerial delivered anti-tank minefield can also be employed for flank protection of advancing forces and for operating in concert with units performing screen and guard missions. The CH 146 does not have a minelaying mission kit. Some coalition countries have this helicopter mission kit capability.

CHAPTER 17

COMMUNICATIONS ASSISTANCE

GENERAL

1. Maintaining command, control, and communications is important to any operation. Land force unit communications may be restricted for a variety of reasons. Helicopters can provide communication enhancement through airborne radio rebroadcast (RRB) or radio relay. Helicopters can also provide service dispatch to deliver plans, messages and documents that cannot be delivered by other means. Communications support tasks may also include any activity, which may be executed by signals personnel operating from a helicopter platform.

RADIO REBROADCAST

2. Radio rebroadcast (RRB) is the retransmission of a radio signal from one ground station, on one helicopter radio, through a second onboard radio, to another ground station, on another frequency. In order for RRB to function, the helicopter must be equipped with two similar radios, each with an RRB feature. When setting up an RRB, the helicopter crew establishes contact with each ground unit on the two separate onboard radios, operating on two different frequencies. Once contact is made, the crew then switches both radio sets to the "RRB" function and advises the two ground stations that the RRB net is operating. This capability allows two ground stations, out of line of sight, to communicate over long distances, through the helicopter. Once the relay is set up, it will continue to operate until the crew turns it off, or the helicopter no longer is in line of sight of both stations. The helicopter crew can monitor the conversation, but there is no requirement to do so.

RADIO RELAY

3. Radio relay is very different from an RRB and any helicopter is capable of conducting this mission, as long as the helicopter has communications with both ground stations. Radio relay simply involves relaying the information sent from one station through one of the helicopter crew, who simply repeats the verbal message "through me" to the receiving station. For example, if G29 wanted to pass the message "your location in figures 30" to G19, the helicopter pilot would say "G19, this is H13A, through me, from G29, your location in figures 30. Over". This message could be received on one radio on one frequency and relayed on another radio on another frequency or it could all be done on the same radio, on the same frequency. Radio relay can be requested from either ground station. A helicopter crew that can hear both stations trying to contact each other could also volunteer to relay the information. Radio relay can also be useful for internal squadron communications where helicopters operating in the forward areas can relay information through helicopters in the BSA to squadron operations.

AERIAL SERVICE DISPATCH

4. The electronic transmission of messages and documents may not be possible because of munitions employment or enemy jamming operations. Helicopters can be used to deliver messages and documents in these cases or when radio listening silence is imposed or equipment is inoperable. Messages include combat plans and orders, written coordination and control measures, and graphics. Documents delivered include critical reports or reports essential for sustaining combat operations.

AERIAL AND AIRBORNE COMMAND POSTS

5. Aerial and Airborne Command Posts are similar in scope and function to that of a ground based CP. An aerial CP is a helicopter equipped with the necessary comms, personnel and publications to carry on the functions of the helicopter unit's CP, either while the CP is moving, or when the CO wants an aerial CP. A similarly configured helicopter can be used to provide an airborne command post for army commanders. This type of command post is not intended to replace a ground unit's CP, but instead to augment the unit's CP by providing the ground commander with a mobile CP when required for manoeuvre operations.

6. Airborne command posts have not been used to any extent in Canada. The CH135 had a command post mission kit consisting mainly of a radio console for army commanders to utilize, but it was neither a high tech nor a high fidelity system. Command posts have been used much more extensively in the US Army. Airborne command posts are currently available in the UH 60, Blackhawk. Their use is detailed as follows:

a. **Utilization**. Blackhawks can be configured with a command and control console to provide manoeuvre commanders with an aerial C^2 platform. These helicopters will be placed under the OPCON of the manoeuvre commander. Airborne command post helicopters can fly missions in support of the division command group, ground brigade commanders, or attack helicopter battalion commanders. Using an airborne command post, the commander enjoys maximum mobility without sacrificing access to information and without jeopardizing continuity of operations due to CP relocation; and

b. **Communications**. The UH 60 C^2 helicopter contains a command console and a map board that can function as an airborne or ground CP, providing communications in both secure and nonsecure modes. The helicopter provides the using commander with:

(1) VHF/AM or FM secure communications;

(2) FM frequency hopping/secure communications;

(3) HF secure with Have Quick I and II communications;

(4) SATCOM; and

(5) HF non-secure communications.

CHAPTER 18

PERFORMANCE CHARACTERISTICS OF NATO HELICOPTERS

Aircraft Type	Category (Note 2)	Pax (Note 3)	Payload (kg)/Range (km) (Note 4)						Weapons	Normal Cruise Speed (kts)	LP Size (Note 5)	Fuel Usage Rate (ltrs/hr)	Maximum Usable fuel (ltrs)
			Radius of Action 50 km		Radius of Action 120 km		Internal Payload at Max Range						
			Internal Payload	U'slung Payload	Internal Payload	U'slung Payload	Internal Payload	Max Range					
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
BELGIUM													
A 109 BA	Armed	0	585	-	475	-	150	360	6 TOW	120	3	275	725
A 109 BA	Recce/ Liaison	6	585	-	475	-	150	360	-	130	3	275	725
ALOUETTE II 318C	Recce/ Utility	3	400	250	280	250	160	320	-	90	3	140	565
ALOUETTE III 316O	Utility	5	400	300	330	300	200	225	-	90	3	200	560
CANADA													
CH 146 Griffon	Utility	8	1,500	1,500	1,450	1300	900	550	2 X 7.62 Machine Guns	120	2	425	1,000
DENMARK													
CAYUSE OH-6	Recce	3	360	200	300	200	240	550	-	100	1	100	227
FENNEC AS 550	Armed	-	-	-	-	-	-	-	4 TOW	100	2	175	540
FRANCE													
ALOUETTE II 313	Utility	2	300	350	160	160	80	400	-	5	3	170	565
ALOUETTE II 318	Utility	2	300	400	200	250	130	640	-	90	3	140	565
ALOUETTE III 316	Utility	5	300	650	300	550	360	500	-	100	3	200	560
COUGAR	Transport	18/24	3,200	3,200	2,900	2,900	1,900	750	-	145	3	600	1,980
DAUPHIN	Utility	7	900	0	750	0	200	730	-	145	3	380	1,125
FENNEC AS 55UN	Utility	5	630	630	500	500	50	750	20 mm Cannon (Air Force version)	120	3	230	730
FENNEC AS 355	Armed	-	-	-	-	-	-	-	20 mm Cannon	*	*	*	*
GAZELLE 341C	Armed/ Recce	-	-	-	-	-	-	-	20 mm Cannon	120	3	170	530
GAZELLE 342M	Utility	3	400	-	300	-	100	650	-	120	3	180	530
GAZELLE 342 M1	Armed	-	-	-	-	-	-	-	4 HOT day/night	*	*	*	*
GAZELLE 342 ML1	Armed	-	-	-	-	-	-	-	4 HOT or 4 MISTRAL	130	3	180	530
LYNX MK IV	Armed	-	-	-	-	-	-	-	*	120	3	380	950
PANTHER	Armed	-	-	-	-	-	-	-	*	135	3	380	1,125
PUMA 8a	Transport	12/16	2,100	2,100	1,800	1,800	1,250	450	-	130	3	600	1,565
SUPER FRELON	Transport	27	2,100	2,900	1,600	2,450	1,100	480	-	120	3	1,000	3,500

Aircraft Type	Category (Note 2)	Pax (Note 3)	Payload (kg)/Range (km) (Note 4)						Weapons	Normal Cruise Speed (kts)	LP Size (Note 5)	Fuel Usage Rate (ltrs/hr)	Maximum Usable fuel (ltrs)
			Radius of Action 50 km		Radius of Action 120 km		Internal Payload at Max Range						
			Internal Payload	U'slung Payload	Internal Payload	U'slung Payload	Internal Payload	Max Range					
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
GERMANY													
CH-53 G	Transport	36	6,500	6,500	6,000	6,000	5,500	360	-	120	4	1,200	2,230
UH-1D	Utility	4-9	1,210	1,210	1,000	1,000	800	350	-	90	3	300	780
BO 105 M	Recce/ Liaison	4	660	-	550	-	350	425	-	110	3	220	550
BO 105 P	Armed	-	-	-	-	-	-	320	6 HOT	100	3	240	500
GREECE													
CH-47	Transport	44	12,690	12,690	12,690	12,690	-	-	*	120	3	2,700	5,083
OH-58	Utility	5	499	544	499	544	-	-	*	90	1	95	270
UH-1H	Utility	11	2,041	1,814	2,041	1,814	-	-	*	90	2	362	791
ITALY													
A 109 T/A (EOA 1)	Recce/ Liaison	5	500	-	450	-	200	430	-	125	1	230	703
A 109 T/B (EOA 2)	Armed	-	-	-	-	-	-	-	Rockets 70 mm	125	1	230	530
A 129	Attack	-	-		-	-	-	-	8 TOW Rockets 81 mm	125	1	360	900
AB 205	Utility	13	1,599	1,594	1,368	1,341	1,208	340	MG + Rockets	80	2	318	830
AB 206	Recce	2	316	396	238	318	171	326	Minigun 7.62	80	1	110	291
AB 212	Utility	13	1,513	1,482	1,249	1,232	1,091	303	MG + Rockets	80	2	318	768
AB 412	Utility	13	1,600	1,400	1,380	1,183	1,260	360	MG + Rockets	80	2	303	783
CH 47C	Transport	38	9,300	8,700	8,500	7,500	7,500	450	MG 7.62 mm	90	3	1,300	3,960
NETHERLANDS													
ALOUETTE III	Utility	5	*	*	*	*	*	*	-	100	3	200	560
APACHE NAH-64D	Attack								30mm Gun 2.75 FFAR AGM	100	2	478	1900
BO-205CB/CB4	Utility	3	300/300	0/400	300/300	0/300	300/300	0/200	-	120	5	250	568
CHINOOK CH-47D	Transport	33	10,500	9,000	*	*	*	*	-	120	3	1,000	3,558
COUGAR AS 532 U2	Transport	28	4,500	3,000	4,000	3,000	3,500	3,000	-	130	3	500	1,950
NORWAY													
BELL 412 SP	SAR	11	1000		600		500		-	120	1	400	1,216
PORTUGAL													
ALOUETTE III S316O	Utility	5	400	300	*	*	*	*	12 x 2.75" Rocket or 1 x 20 mm Cannon	90	2	210	550
PUMA SA 330	Transport Support	18	2,400	2,100	*	*	*	*	-	120	3	360	2,250

Aircraft Type	Category (Note 2)	Pax (Note 3)	Payload (kg)/Range (km) (Note 4)						Weapons	Normal Cruise Speed (kts)	LP Size (Note 5)	Fuel Usage Rate (ltrs/hr)	Maximum Usable fuel (ltrs)
			Radius of Action 50 km		Radius of Action 120 km		Internal Payload at Max Range						
			Internal Payload	U'slung Payload	Internal Payload	U'slung Payload	Internal Payload	Max Range					
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
SPAIN													
B0-105 (HR-15)	Recce	3	660	-	*	*	*	*	20 mm GUN	100	1	210	580
B0-105 (HR-15)	Armed	-	-	-	*	*	*	*	6 HOT	100	1	210	580
CHINOOK CH-47C (HT-17)	Transport	33	9,000	9,000	*	*	*	*	-	120	6	1,300	3,885
CHINOOK CH-47D (HT-17)	Transport	33	9,000	9,000	*	*	*	*	-	120	5	1,300	3,885
IROQUOIS UH-1H (HU-10)	Utility	10	1,100	1,800	*	*	*	*	40 mm M94 2.75" M-20D 7.62 mm GUN 12.70 mm GUN	90	2	313	800
IROQUOIS UH-1N (HU-18)	Utility	12	1,500	2,270	*	*	*	*		90	2	340	800
KIOWA CH-58A (HR-12)	Recce	3	432	-	*	*	*	*	7.62 mm MG	90	1	85	240
SUPER PUMA (HT-21)	Transport	22	3,000	3,000	*	*	*	*	-	120	3	530	1,460
TURKEY													
AGUSTA BELL AB-204	Utility	8	1,206	*	*	*	*	*	7.62 mm MG-3	80	2	-	-
AGUSTA BELL AB-205	Utility	11	1,542	*	*	*	*	*	7.62 mm MG-3	90	2	318	791
AGUSTA BELL AB-212	Utility	12	1,650	2,270	*	*	*	*	-	130	2	583	1,458
BLACK-HAWK UH-60	Utility	14	3,674	3,629	*	*	*	*	-	145	2	560	1,370
COBRA AH-1P	Attack	-	-	-	-	-	-	-	10 mm GUN 2.75" RP TOW	123	2	318	791
COUGAR AS-532	Utility	18-24	4,500	*	*	*	*	*	-	139	3	600	1,980
IROQUOIS UH-1H	Utility	11	1,542	-*	*	*	*	*	7.62 mm MG-3	90	2	318	791
KIOWA B/C OH-58	Recce	2	408	-	-	-	-	-	7.62 mm MG	90	1	115	344
SUPERCOBRA AH-1W	Attack	-	-	-	-	-	-	-	20 mm GUN 2.75" RP TOW, Hellfire	151	2	525	786

Aircraft Type	Category (Note 2)	Pax (Note 3)	Payload (kg)/Range (km) (Note 4)						Weapons	Normal Cruise Speed (kts)	LP Size (Note 5)	Fuel Usage Rate (ltrs/hr)	Maximum Usable fuel (ltrs)
			Radius of Action 50 km		Radius of Action 120 km		Internal Payload at Max Range						
			Internal Payload	U'slung Payload	Internal Payload	U'slung Payload	Internal Payload	Max Range					
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
UNITED KINGDOM													
CHINOOK HC Mk 2	Transport	30-54	9,200	9,200	8,500	8,000	7,200	400	7.62 mm MG 7.62 mm Minigun	135	5	1539	3718
PUMA HC Mk 1	Transport	12-16	2,000	2,000	1,800	1,800	1,300	320	7.62 mm MG	130	3	690	1312
SEA KING Mk 4	Transport	20-27	2,720	2,472	2,350	2,350	0	1,016	-	100	5	675	3,750
LYNX AH Mk 7	Utility	9	1,020	940	680	680	450	550	7.62 mm MG	120	1	380	950
LYNX AH Mk 7	Armed	-	missile off		-	-	-	-	8 TOW	120	1	450	950
			540	460	440	440	190	490					
LYNX AH Mk 9	Utility	9	1,100	1,100	910	910	700	500	7.62 mm MG	145	1	550	950
GAZELLE AH 1	Recce	-	280	215	200	135	200	510	-	130	1	190	440
GAZELLE AH 1	Liaison	1-3	305	240	225	160	225	530	-	130	1	190	440
UNITED STATES													
OH-6 CAYUSE	Recce	3	454	-	*	*	*	*	-	90	1	83	231
OH-58C KIOWA	Recce	3	408	-	*	*	*	*	-	90	1	102	270
OH-58D KIOWA	Recce	-	-	-	*	*	*	*	.50" MG 70 mm RP HELLFIRE STINGER	90	1	155	424
UH-1H IROQUOIS	Utility	11	1,542	1,542	*	*	*	*	7.62 mm MG	90	2	318	791
UH-60 BLACKHAWK	Utility	14	3,674	3,629	*	*	*	*	7.62 mm MG	120	2	560	1370
CH-47C CHINOOK	Transport	33	10,206	9,072	*	*	*	*	7.62 mm MG	120	3	1,769	4,321
CH-47D CHINOOK	Transport	33	10,886	9,072	*	*	*	*	7.62 mm MG	120	3	1,515	3,916
AH-1F COBRA	Attack	-	1,088	-	*	-	*	-	20 mm Gun 2.75" RP TOW	120	2	370	985
AH-64 APACHE	Attack	-	-	2,700	-	*	-	*	30 mm Cannon 70 mm RP HELLFIRE	140	2	478	1,400
AH-1T SEA COBRA	Attack	-	1,365	1,365	*	*	*	*	2.75" FFAR 5" ZUNI 20 mm, TOW SIDEWINDER SIDEARM	140	2	466	1,223
AH-1W SUPER SEA COBRA	Attack	-	1,814	1,814	*	*	*	*	2.75" FFAR 5" ZUNI 20 mm, TOW HELLFIRE SIDEWINDER SIDEARM	140	2	525	1,165

Aircraft Type	Category (Note 2)	Pax (Note 3)	Payload (kg)/Range (km) (Note 4)						Weapons	Normal Cruise Speed (kts)	LP Size (Note 5)	Fuel Usage Rate (ltrs/hr)	Maximum Usable fuel (ltrs)
			Radius of Action 50 km		Radius of Action 120 km		Internal Payload at Max Range						
			Internal Payload	U'slung Payload	Internal Payload	U'slung Payload	Internal Payload	Max Range					
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)
UNITED STATES (Cont)													
UN-1N HUEY	Utility	8 Note 6	907	907	•	•	•	•	2 x .50Cal M-60 MG 2.75FFAR GAU 17	110	2	350	786
CH-46E SEA KNIGHT	Transport	15 Note 6	2,268	2,268	•	•	•	•	2 x .50Cal (2.7mm)	120	3	700	1,398
CH-53A SEA STALLION	Transport	30 Note 6	6,305	6,305	•	•	•	•	2 x .50Cal (2.7mm)	130	4	1,050	2,414
CH-53 D SEA STALLION	Transport	30 Note 6	5,715	5,725	•	•	•	•	2 x .50Cal (12.7mm)	130	4	1,165	6,987
CH-53E SUPER SEA STALLION	Transport	30 Note 6	12,474	12,474	•	•	•	•	2 x .50Cal (12.7mm)	130	4	1,805	9,051

NOTES:

(1) Units of measurement - kilograms (kg), kilometres (km), nautical miles per hour (kts), litres (ltrs).
(2) Aircraft Category - see Glossary.
(3) Number of passengers depends on aircraft configuration.
(4) Internal Fuel Tanks, Sea Level ISA conditions (USL configuration may influence radius of action).
(5) LP size - see Chapter 11.
(6) Combat loaded troops.

ABBREVIATIONS AND ACRONYMS

A	AA	Assembly Area
	AAA	Anti-Aircraft Artillery
	AAR	After Action Report
	AAAD	All Arms Air Defence
	AAH	Anti-Armour Helicopter
	AAM	Air to Air Missile
	ABCCC	Airborne Command, Control and Communications
	ABCA	America, Britain, Canada and Australia
	ABDR	Aircraft Battle Damage Repair
	AC	Aircraft Captain/Aircraft Commander
	ac	Aircraft
	ACA	Airspace Control Authority
	ACC	Air Component Commander
	ACL	Allowable Cabin/Cargo Load
	ACM	Airspace Control Measures
	ACO	Airspace Control Order
	ACP	Air Control Point
	ACS	Airspace Control System
	AD	Air Defence
	ADC	Air Defence Commander
	ADA	Air Defence Artillery
	ADTB	Army Doctrine Tactics Board
	AFC	Airmobile Force Commander
	AFV	Armoured Fighting Vehicle
	AGM	Air to Ground Missile
	AGL	Above Ground Level
	AH	Attack Helicopter
	AI	Area of Interest
	ALO	Air Liaison Officer
	AMC	Aviation Mission Commander
	AMO	Aircraft Maintenance Organization
	AMS	Avionics Management System
	AMSE	Aircraft Maintenance Support Equipment
	AMSFOR	Airmobile Security Forces
	AMRAAM	Advanced Medium Range Air to Air Missile
	AO	Area of Operations
	AOP	Air Observation Post
	AOC	Area Operations Centre
	AOCC	Air Operations Coordination Centre
	ARH	Armed Reconnaissance Helicopter
	ASAP	As Soon As Possible
	ASE	Aircraft Survivability Equipment
	ASOC	Air Support Operations Centre
	ASC	Airspace Control

	ASRAAM	Advanced Short Range Air to Air Missile
	AT	Anti-Tank
	ATC	Air Traffic Control
	ATGM	Anti-Tank Guided Missile
	ATO	Air Tasking Order
	AUC	Aviation Unit Commander
	AUW	All-Up Weight
	AWACS	Airborne Warning And Control System
B	BC	Battery Captain
	BDR	Battle Damage Repair
	BDZ	Base Defence Zone
	BP	Battle Position
	BSA	Brigade Support Area
C	C2	Command and Control
	CAS	Close Air Support
	CATO	Concealed Approach and Take Off
	CEOI	Communications Electronic Operating Instructions
	CFSA	Corps Forward Support Area
	CL	Coordination Level
	CLA	Creeping Line Ahead
	C&L	Command and Liaison
	CMDS	Counter Measures Dispensing System
	CO	Commanding Officer
	COMD	Commander
	COMJAM	Communications Jamming
	COMSEC	Communications Security
	COOP	Customer On-Line Ordering Process
	COPPED	Cover, Obstacles, Position of fire, Position of observation, Enemy, Distance
	COSCOM	Corps Support Command
	CP	Command Post
	CRAS	Contingency Response Aircraft Spares
	CRK	Contingency Response Kit
	CRSA	Corps Rear Support Area
	CS	Close Support
	C/S	Call Sign
	CSA	Corps Support Area
	CSAR	Combat Search and Rescue
	CSS	Combat Service Support
	C2	Command and Control
	C3	Command, Control & Communications

D	D/AMC	Deputy Aviation Mission Commander
	DC	Dangerous Cargo
	DCO	Deputy Commanding Officer
	DEWS	Defensive Early Warning Suite
	DF	Direction Finding
	DISGP	Division Service Group
	DME	Distance Measuring Equipment
	DP	Decision Point
	DS	Direct Support
	DSA	Divisional Support Area
	DTC	Data Transfer Cartridge
	DTG	Date Time Group
E	EA	Engagement Area
	ECM	Electronic Counter Measures
	ECCM	Electronic Counter-Counter Measures
	ELINT	Electronic Intelligence
	ELT	Emergency Locator Transmitter
	EMCON	Emission Control
	EO	Electro-Optical
	EP	Electronic Protection
	EPIRB	Emergency Position Indicating Rescue Beacon
	EPM	Electronic Protection Measures
	ERSTA	Electro-optical Reconnaissance Surveillance and Target Acquisition
	ES	Electronic Support
	ESM	Electronic Support Measures
	ETA	Estimated Time of Arrival
	EW	Electronic Warfare
	EWO	Electronic Warfare Officer
F	FAA	Forward Assembly Area
	FAADS	Forward Area Air Defence System
	FAC	Forward Air Controller
	FARE	Forward Area Refuelling Equipment
	FARP	Forward Arming and Refuelling Point
	FC	Fire Coordinator
	FCO	Fire Control Order
	FCM	Fire Control Measures
	FE	Flight Engineer
	FEBA	Forward Edge of the Battle Area
	FFA	Free Fire Area
	FFE	Fire For Effect
	FLET	Forward Line Enemy Troops
	FLIR	Forward Looking Infra-Red
	FLOT	Forward Line of Own Troops
	FOB	Forward Operating Base

	FOO	Forward Observation Officer
	FRAG O	Fragmentary Order
	FS	Fire Support
	FSCC	Fire Support Coordination Centre
	FSCL	Fire Support Coordination Line
	FSE	Fire Support Element
	FSO	Fire Support Officer
G	GPS	Global Positioning System
	GPMG	General Purpose Machine Gun
	GS	General Support
H	HA	Holding Area
	HAZMAT	Hazardous Material
	HCCR	Hot Closed Circuit Refuelling
	HELACK	Acknowledgement to Helicopter Request Message
	HELLSREP	Helicopter Landing Site Report
	HELQUEST	Helicopter Request Message
	HELTASK	Helicopter Tasking Message
	HF	High Frequency
	HICHS	Helicopter Internal Cargo Handling System
	HIDACZ	High Density Airspace Control Zone
	HLVW	Heavy Logistics Vehicle Wheeled
	HLS	Helicopter Landing Site
	HTH	Heavy Transport Helicopter
	HUD	Head-Up Display
	HUMINT	Human Intelligence
	HVQK	Have Quick
I	IAS	Indicated Air Speed
	IFF	Identification Friend or Foe
	IFR	Instrument Flight Rules
	IFV	Infantry Fighting Vehicle
	IGE	In Ground Effect
	IMC	Instrument Meteorological Conditions
	IIMC	Inadvertent Instrument Meteorological Conditions
	IMINT	Image Intelligence
	IO	Intelligence Officer
	Info Ops	Information Operations
	IP	Initial Point
	IPB	Intelligence Preparation of the Battlefield
	IR	Infra-Red
	IRSS	Infra-Red Suppression System
	ISB	Initial Staging Base
	ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance

J	JAAT	Joint Air Attack Team
	JC2IS	Joint Command and Control Information System
	JFACC	Joint Force Air Component Commander
	JFC	Joint Force Commander
	JSEAD	Joint Suppression of Enemy Air Defences
	JTF	Joint Task Force
K	KIAS	Knots Indicated Air Speed
L	LD	Line of Departure
	LDO	Laser Designator Operator
	LEP	Light External Pintle
	LEPC	Light External Pintle Connector
	LLAD	Low Level Air Defence
	LLTR	Low Level Transit Route
	LO	Liaison Officer
	LOC	Lines of Communications
	LOH	Light Observation Helicopter
	LP	Landing Point
	LPH	Light Pintle Head
	LRSU	Long Range Surveillance Units
	LS	Landing Site
	LSVW	Light Support Vehicle Wheeled
	LTL	Laser to Target Line
	LUC	Lifted Unit Commander
	LUH	Light Utility Helicopter
	LZ	Landing Zone
M	MANPADS	Man Portable Air Defence System
	MBT	Main Battle Tank
	MCL	Maximum Combat Load
	MEZ	Missile Engagement Zone
	MLH	Medium Lift Helicopter
	MLRS	Multiple Launch Rocket System
	MLVW	Medium Logistics Vehicle Wheeled
	MOB	Main Operating Base
	MOPP	Mission Oriented Protective Posture
	MPS	Mission Planning Station
	MRAAM	Medium Range Anti-Armour Missile
	MRAAW	Medium Range Anti-Armour Weapon
	MSO	Maintenance Support Officer
	MSR	Main Supply Routes
	MTH	Medium Transport Helicopter

N	NAI	Named Areas of Interest
	NBC	Nuclear, Biological, Chemical
	NEO	Non-combatant Evacuation Operation
	NFA	No-Fire Area
	NFL	No-Fire Line
	NOCL	Notice Of Crash Location
	NOE	Nap of the Earth
	NORDO	No Radio
	NVD	Night Vision Device
	NVG(s)	Night Vision Goggle(s)
O	OGE	Out of Ground Effect
	OIC	Officer In Charge
	OOTW	Operations Other Than War
	OP	Observation Post
	OPCOM	Operational Command
	OPCON	Operational Control
	Op O	Operations Order
	ORS	Operational Readiness State
P	PGM	Precision Guided Munition
	PIR	Priority Intelligence Requirement
	PL	Phase Line
	PLB	Personal Locator Beacon
	POC	Point(s) of Contact
	POL	Petrol, Oil and Lubricants
	PSO	Peace Support Operations
	PUAS	Pack Up Aircraft Spares
	PUP	Pull Up Point
	PZ	Pick-up Zone
Q	QRF	Quick Reaction Force
R	RAH	Reconnaissance Attack Helicopter
	RAS	Rear Area Security
	RCC	Rescue Coordination Centre
	RFL	Restrictive Fire Line
	RLWR	Radar Laser Warning Receiver
	ROA	Restricted Operations Area
	ROE	Rules of Engagement
	RON	Remain Over Night
	ROZ	Restricted Operations Zone
	RP	Replenishment Point
	RPV	Remotely Piloted Vehicle
	RRB	Relay Rebroadcast Station
	RSO	Range Safety Officer

	RT	Radio Telecommunications
	RTB	Return To Base
	RV	Rendezvous
	RLWR	Radar Laser Warning Receiver
S	SA	Safety Assistant
	SAAFR	Standard use Army Aircraft Flight Route
	SAM	Surface to Air Missile
	SAR	Search and Rescue
	SC	Special Corridor
	SEAD	Suppression of Enemy Air Defence
	SES	Special Equipment Shelters
	SEV	Special Equipment Vehicles
	SHORAD	Short Range Air Defence
	SIC	Subject Indicator Code
	SIF	Selective Identification Feature
	SIGINT	Signals Intelligence
	SMM	Standard Manoeuvre Manual
	SOI	Signal Operating Instructions (see also CEOI)
	SOP(s)	Standard Operating Procedure(s)
	SPINS	Special Instructions
T	TA	Target Acquisition
	TACAIR	Tactical Air Support
	TAC CP	Tactical Command Post
	TACOM	Tactical Command
	TACON	Tactical Control
	TACP	Tactical Air Control Party
	TAI	Target Areas of Interest
	TAMS	Tactical Air Movement Section
	TC	Transit Corridor
	TH	Transport Helicopter
	TI	Thermal Imagery
	TMRR	Temporary Minimum Risk Route
	T/O	Take-Off
	TO&E	Tables of Organization and Equipment
	TOW	Tube-launched Optically-tracked Wire-Guided
	TR	Transit Route
	TTPs	Tactics, Techniques and Procedures
	TUA	TOW Under Armour
U	UAV	Unmanned Aerial Vehicles
	UH	Utility Helicopter
	UMS	Unit Medical Station
	UTTH	Utility Tactical Transport Helicopter

V	VNE	Velocity Not to Exceed
	VTOL	Vertical Take Off and Landing
W	WCO	Weapon(s) Control Order
	WCS	Weapons Control Status
	WFZ	Weapons Free Zone
	WP	White Phosphorus

GLOSSARY

AEROMEDICAL EVACUATION (MEDEVAC). The timely, efficient movement and enroute care by medical personnel of wounded and injured personnel from the battlefield and other locations to medical treatment facilities.

AIRCRAFT CAPTAIN/ AIRCRAFT COMMANDER (AC). The aircrew member designated by competent authority as being in command of an aircraft and responsible for its safe operation and accomplishment of the assigned mission. (AAP-6).

AIRMOBILE OPERATION. An operation in which combat forces and their equipment move about the battlefield in aircraft, normally helicopters, under the control of a ground force commander, to engage in ground combat. (ADTB).

AIR MOVEMENT. Air transport of units, personnel, supplies and equipment including airdrops and air landings. (AAP-6).

AIR OBSERVATION POST (AOP). An airborne position from which military observations are made, or fire directed and adjusted, and which possess appropriate communications. (AAP-6).

AIR SUPPORT OPERATIONS CENTRE (ASOC). An agency of a tactical control system, collocated with a corps headquarters or an appropriate land headquarters, which coordinates and directs CAS and other tactical air support.

AIRSPACE COORDINATION AREA (ACA). A three-dimensional block of airspace that provides lateral and altitude separation between aircraft and other fire support assets, and is established by a brigade or higher.

AIRSPACE CONTROL ORDER (ACO). When all airspace requests have been correlated and conflicts resolved, the Air Component Commander will promulgate the Airspace Control Order. Airspace Control Measures (ACMs) and procedures are normally in force for the period of validity of the ACO. (See ATP-40(A)).

ANTI-ARMOUR HELICOPTER (AAH). A helicopter armed primarily for use in the destruction of armoured targets. Also called 'anti-tank helicopter'. (AAP-6).

ARMED HELICOPTER. A helicopter fitted with weapons or weapon systems. (AAP-6).

ASSAULT AIRCRAFT. Powered aircraft, including helicopters, which move assault troops and cargo into an objective area and which provide for their resupply. (AAP-6).

ATTACK HELICOPTER (AH). A helicopter specifically designed to employ various weapons to attack and destroy enemy targets. (AAP-6).

AVIATION. Helicopters and other battlefield aerial vehicles, together with their organic support, employed in land operations.

CASUALTY EVACUATION (CASEVAC). The movement of casualties to initial treatment facilities and/or to medical facilities in the combat zone.

CATERPILLAR MOVEMENT. Tactical movement in which the forward element waits for the rear element to move to its position, before continuing its advance.

CHALK COMMANDER. The commander of all troops embarked under one chalk number. (AAP-6).

CHALK NUMBER. The number given to a complete load and to the transporting carrier. (AAP-6). (See also 'Serial').

CLOSE FORMATION. Formation spacing normally three to five rotor disc diameters at night and not less than 5 rotors during the day between a/c in a section and ten rotors between section leads in an element measured between tip-path planes between a/c.

COMBAT AIRLIFT/ TACTICAL TRANSPORT. The air movement of combat personnel, supplies and/or cargo over short or medium distances, normally in the brigade AOR;

COMBAT SEARCH AND RESCUE (CSAR). A coordinated operation using pre-established procedures for the detection, location, identification and rescue of downed aircrew in hostile territory in crisis or wartime.

COMMAND AND LIAISON (C&L). C&L is the rapid transport of commanders, staff, and liaison officers to save time in battle procedure and to provide commanders with an aerial perspective of their area of operations.

COMMUNICATIONS ASSISTANCE. The assistance to communications by means of radio rebroadcast, radio relay, airborne command post or the physical delivery of operational material by helicopter (aerial dispatch).

CONTOUR FLIGHT. A flight technique designed to take advantage of terrain cover, while enabling the pilot to maintain en route airspeeds ranging from 60 to 120 KIAS. Flown at relatively constant altitudes AGL, between 15 and 50 feet, the flight path is varied to make use of the available ground, obstacles and/or vegetation.

CONTROL. See "Operational Control", "Tactical Control".

COORDINATION ALTITUDE. An altitude that separates air operations from aviation operations, normally expressed in feet. AGL.

COUNTER-MOBILITY. All actions taken to restrict the capacity of movement of the opponent.

CREWMAN. A member of the helicopter crew who travels in the cargo/passenger compartment in certain Helicopters. His duties include taking charge of the chalk troops from emplaning to deplaning.

DIRECTION AND CONTROL OF FIRE. The airborne adjustment of both indirect and direct fire. These fires can come from artillery, mortars, naval guns, close air support aircraft or armed/ attack helicopters.

ELEMENT. A sub-component of a large formation normally comprised of two or more sections with a designated lead having responsibilities in conjunction with the formation's operation, but subordinate to the formation leader. Elements should normally be composed of helicopters with similar capabilities.

EXTENDED FORMATION. Formation spacing normally ten rotors to 1000 metres between aircraft in a section and 300 to 1000 metres between section leads in an element.

F-HOUR. F-Hour is the time at which the first helicopter crosses the Forward Line of Own Troops (FLOT) in a cross-FLOT operation.

FIRE SUPPORT COORDINATION LINE (FSCL). A line established by the appropriate ground commander to ensure coordination of fire not under his control but which may affect current tactical operations. The FSCL is used to coordinate fires of air, ground or sea weapons systems using any type of ammunition against surface targets.

FORMATION LEADER. The individual given responsibility for the planning and conduct of the operation of the formation as a whole.

FORWARD AIR CONTROLLER (FAC). A qualified individual, who from a forward position on the ground or in the air, directs the action of combat aircraft engaged in close air support of land forces.

FREE FIRE AREA (FFA). A specific, designated area into which any weapons system may fire without additional coordination with the establishing headquarters.

H-HOUR. The specific time at which an operation or exercise commences or is due to commence. It is also the time at which the Line of Departure is crossed by the leading elements in an attack.

HELICOPTER. See Anti-armour Helicopter;
Armed Helicopter;
Assault Aircraft;
Attack Helicopter;
Observation Helicopter;
Reconnaissance Helicopter;
Transport Helicopter; or
Utility Helicopter;

HELI-BORNE OPERATION. An operation in which helicopters act in support of a formation, unit or organization to accomplish the movement of troops, supplies and/or equipment.

HELICOPTER LANDING SITE. A site within a landing zone containing one or more landing points.

HELICOPTER MUTUAL SUPPORT. The support provided by one helicopter for another helicopter(s) during a mission.

HIGH DENSITY AIRSPACE CONTROL ZONE (HIDACZ). An area of intense ground operations over which friendly aircraft may be at risk from friendly air defence weapons. A HIDACZ is requested by a land force commander who then controls all the air activity within it.

HOISTING. Lowering or raising troops or cargo by means of a winch or hoist under the control of a helicopter crew member. (Also known as 'Winching' - NATO).

HOOK-UP MAN. The person responsible for attaching the external load and for controlling the take-up of strain of the load slings.

HOUR. See F-Hour;
H-Hour;
L-Hour; or
Y-Hour.

IDENTIFICATION, FRIEND OR FOE (IFF). A system using electromagnetic transmissions to which equipment carried by friendly forces automatically responds, for example, by emitting pulses, thereby distinguishing themselves from enemy forces. (AAP-6). (See also ‘Selective Identification Feature’).

JOINT AIR ATTACK TEAM (JAAT). A coordinated attack involving a combination of aviation and CAS aircraft, supported by field artillery or naval gunfire.

LANDING LIGHT SYSTEM. Lighting equipment on the ground to assist approach and landing.

LANDING POINT. A point within a landing site where one helicopter or vertical take-off and landing aircraft can land. (AAP-6).

LANDING SITE. A site within a landing zone containing one or more landing points. (AAP-6).

LANDING ZONE (LZ). Any specified zone used for the landing of aircraft. (AAP-6).

LEAPFROG MOVEMENT. Tactical movement in which like elements are moved successively through or by one another along the axis of movement of supported forces. (STWG).

L-HOUR. In airmobile operations, the time at which the first helicopter of the heliborne assault wave touches down in the landing zone (LZ).

LOGISTIC TRANSPORT. The aerial transport of defensive stores, commodities and combat supplies either directly to the user or to delivery points where ground logistic units can store or deliver them.

LOH. See Observation Helicopter.

LOOSE FORMATION. Normally five to ten rotor disc diameters between aircraft in a section and 300 metres between section leads in an element measured between tip path planes between helicopters.

LOW LEVEL FLIGHT. A flight technique that generally conforms to a straight line and is flown at a constant altitude ASL and constant airspeed, normally in excess of 80 KIAS. Altitude AGL varies from 50 to 250 feet depending upon the variations in terrain clearance.

LOW LEVEL TRANSIT ROUTE (LLTR). A temporary corridor of defined dimensions established in the forward area to minimize the risks to friendly aircraft from friendly air defence or surface forces.

MANOEUVRE. The employment of forces through movement in combination with speed, firepower or fire potential, to attain a position of advantage in respect to the enemy.

MARSHALLER. A person who directs the ground movement of aircraft by the use of hand and arm or light signals.

MEDEVAC. See "AEROMEDICAL EVACUATION".

MULTI-ROLE HELICOPTER. A Helicopter that is specifically designed to carry out more than one role.

NAP OF THE EARTH (NOE) FLIGHT. Flight technique is designed to make the maximum use of the available terrain masking features. Airspeed varies from translational to 60 KIAS at 15 feet (AGL). The slower airspeeds enable the pilot to maintain minimum obstacle clearance while attaining maximum cover from vegetation, topography and other visual obstructions. This profile may be most appropriate for operations in close proximity to the enemy, high threat environments, or, on approach and departures from areas under observation.

NO FIRE AREA (NFA). An area into which no fire or effects are allowed. The two exceptions are when the establishing headquarters allows fire on a mission by mission basis or when a friendly force is engaged by an enemy located within the NFA, and the commander returns fire in self-defence

NO FIRE LINE (NFL). A line short of which artillery or ships do not fire, except on request or approval of the supported commander, but beyond which they may fire at any time without danger to friendly troops.

OBSERVATION HELICOPTER (OH). A helicopter used primarily for observation and reconnaissance but which may be used for other roles. (AAP-6).

OPERATIONAL COMMAND (OPCOM). The authority granted to a commander to assign missions or tasks to subordinate commanders, to deploy units, to reassign forces, and to retain or delegate operational and/or tactical control as may be deemed necessary. It does not of itself include responsibility for administration or logistics. May also be used to denote the forces assigned to a commander. (AAP-6).

OPERATIONAL CONTROL (OPCON). The authority delegated to a commander to direct forces assigned so that the commander may accomplish specific missions or tasks which are usually limited by function, time, or location; to deploy units concerned, and to retain or assign tactical control of those units. It does not include authority to assign separate employment of components of the units concerned. Neither does it, of itself, include administrative or logistic control. (AAP-6).

OPERATIONS OTHER THAN WAR (OOTW). An operation during peacetime and conflict that does not necessarily involve armed clashes between two organized forces

PAYLOAD. The sum of the weight of passengers and cargo that an aircraft can carry. (AAP-6).

RADIUS OF ACTION. The maximum distance a ship, aircraft, or vehicle can travel away from its base along a given course with normal combat load and return without refuelling, allowing for all safety and operating factors. (AAP-6).

RAPID REFUELLING A means of refueling helicopters with engines running and rotor(s) running or stopped.

RAPPELLING. Descent by a rope or tape from a helicopter and controlling such descent by a friction device applied by a descending individual or by a helicopter crew member. (Also known as 'Abseiling').

READY POSITION. In helicopter operations, a designated place where a helicopter load of troops and/or equipment waits for pick-up. (AAP-6).

RECONNAISSANCE. Reconnaissance is a mission undertaken to obtain information by surveillance or other detection methods, about the activities and resources of an enemy.

RECONNAISSANCE HELICOPTER. A helicopter designed primarily for reconnaissance operations.

RESTRICTIVE FIRE AREA (RFA). An area with specific restrictions and in which fire that exceeds those restrictions is not delivered without coordination with the establishing headquarters.

SECTION. A section normally constitutes two aircraft operating together in formation, one designated as "lead" and the other as "wingman". As a sub-component of a larger formation, the section lead may be given responsibilities or tasks for his section, but remains subordinate to the formation lead.

SECURITY. The condition achieved when designated information, material, personnel, activities and installations are protected against espionage, sabotage, subversion and terrorism. (AAP-6).

SELECTIVE IDENTIFICATION FEATURE (SIF). Airborne pulse type transponder that provides automatic selective identification of aircraft in which it is installed, to friend-or-foe identification installations, whether ground, shipboard, or airborne. (AAP-6). (See also 'Identification Friend or Foe').

SERIAL. An element or a group of elements within a series which is given a numerical or alphabetical designation for convenience in planning, scheduling and control (AAP-6). (See also 'Chalk Number').

SNAKE MOVEMENT. A type of caterpillar movement in which both elements are continuously on the move.

SPECIAL OPERATIONS. An operation conducted outside the normal combat and OOTW missions and tasks usually associated with tactical helicopter operations.

SPECIAL CORRIDOR (SC). An area established specifically to accomplish the special routing requirements of specific missions. (ATP-40(B)).

STANDARD USE ARMY AIRCRAFT FLIGHT ROUTE (SAAFR). A route established below the coordination altitude to facilitate movement of helicopters in the forward area in direct support of ground operations. (ATP-40(B)).

SURVEILLANCE. The systematic observation of the battle space by visual, aural, electronic, photographic or other means to detect, track and report enemy movements, strengths and avenues of approach.

TACTICAL AIR MOVEMENT SECTION (TAMS). Personnel who are concerned with organization and control of loading within a pick-up zone/site.

TACTICAL CONTROL (TACON). The detailed and, usually, local direction and control of movements or maneuvers necessary to accomplish missions or tasks assigned. (AAP-6).

TACTICAL REFUELLING. Refuelling during operations normally conducted away from a fixed facility.

TACTICAL SECURITY. The measures necessary to deny information to the enemy and to ensure that a force retains its freedom of action and is warned or protected against an unexpected encounter with the enemy or an attack. (AAP-6).

TACTICAL TRANSPORT. See combat airlift.

TARGET ACQUISITION (TA). The detection, identification and location of a target in sufficient detail to permit the effective employment of weapons. (AAP-6).

TERRAIN FLIGHT. Flight close to the earth's surface during which airspeed, height and/or altitude are adapted to the contours and cover of the ground in order to avoid enemy detection and fire. (AAP-6). This includes - low flying, contour flying and Nap of the Earth (NOE) flying.

TRANSPORT HELICOPTER (TH). A helicopter used primarily for the carriage of troops and/or equipment. (Also called 'Cargo Helicopter', ie. CH 47. See also 'Utility Helicopter') Transport Helicopters are designated according to their maximum all up weight, as follows:

Light	6-7.99 tonnes;
Medium	8-10.99 tonnes; and
Heavy	11 tonnes and over (AC 225 (Panel X)).

TRANSIT CORRIDOR (TC). A bi-directional corridor in the rear area. (Air traffic control is not normally provided). (ATP-40(B)).

TRANSIT ROUTE (TR). A temporary, bi-directional corridor of defined dimensions, established in the forward area to minimize risks to friendly aircraft from friendly Air Defence. The dimensions are mission specific and the centre line will be defined in the ACOs by a series of points.

UTILITY HELICOPTER (UH). A multi-purpose helicopter capable of lifting troops but may be used in command and control, logistics, casualty evacuation or armed helicopter role. (AAP-6).

WEAPON(S) CONTROL ORDER (WCO). The order which promulgates the Weapons Control Status. (See WCS).

WEAPONS CONTROL STATUS (WCS). Weapons control of AD weapons systems is expressed as a status declared for a particular area and time. It defines the degree of freedom to be afforded to AD weapon systems. AD weapons systems that are able to engage targets in volumes of airspace allocated to friendly air activity automatically adopt a specified restrictive WCS in the appropriate engagement arcs regardless of the fact that a more permissive WCS might apply to them.

WEAPONS FREE. In air defence, a weapon control order imposing a status whereby weapons systems may be fired at any target not positively recognized as friendly. (AAP-6).

WEAPONS HOLD. In air defence, a weapon control order imposing a status whereby weapons systems may only be fired in self-defence or in response to a formal order. (AAP-6).

WEAPONS TIGHT. In air defence, a weapon control order imposing a status whereby weapons systems may be fired only at targets recognized as hostile. (AAP-6).

Y-HOUR. In airmobile operations the time at which the first helicopter in the first wave departs the Pick-up Point or Pick-up Zone (PZ).